Marco Zanuso, Eduardo Vittoria, Olivetti sud, Marcianise. Photo by Gino Saracino, 2014.

The construction of the modern factory. The introduction of prefabrication in Terra di Lavoro

Francesca Castanò

Department of Architecture and Industrial Design, University of Campania Luigi Vanvitelli

Email: francesca.castano@unicampania.it

Abstract: This paper focuses on the investigation and understanding of the industrial heritage designed and built in the Campania region, between Naples and Caserta, by the most important Italian architects and engineers in the post-war season. The principal aim of this paper is to present the rich and heterogeneous catalogue of factories designed in these years through unpublished drawings and photos from the building sites.

These examples show a notion of modularity that brings interesting innovations in terms of on-site prefabrication of modular components and construction systems. The construction of these factories is therefore in contrast with Italy's traditional building techniques based on craft approach and intense use of labour. The project of these factories is the outcome of the effort of famous architects and engineers, such as Lugi Figini e Gino Pollini, Angelo Mangiarotti, Marco Zanuso, Eduardo Vittoria, and Gigi Ghò, who experimented new structural solutions based on the orderly and coherent composition of prefabricated elements. This research stems from the revitalised interest in studies of prefabrication in Italy between the 50's and the 70's of the last century, and is focused on the innovative aesthetics outcomes developed from it. In addition, this paper contributes to evaluate the qualitative connections between construction, geography and labour, assessing the friction between the advanced products and knowledge imported from the North and the agricultural vocation of these regions. The paper will also put in relation the development of prefabrication systems in the less-developed South of Italy in the wider context of the great industrialization boosted by political decisions and the government financial help of the "Cassa del Mezzogiorno".

Keywords: industrial heritage, prefabrication systems, II post-war, Cassa del Mezzogiorno, Southern Italy.

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1. Introduction

This paper focuses on the analysis and understanding of the industrial heritage designed and built in Terra di Lavoro –named after the ancient *Laboris* land in the area between Naples and Caserta– by the most important Italian architects and engineers in the post-war season. It concerns a large collection of works made by architects, structural engineers, and entrepreneurs from northern Italy, developed through high quality experimentation in a relatively small region which includes the selected cases, specifically analyzed in the follow-up to this contribution.

Each one of these factories has different features and shows interesting solutions both from a structural and architectural point of view. All of them offer a tangible example of the most innovative prefabrication systems. This paper focuses on four case studies in particular: the Manifattura Ceramica Pozzi by Luigi Figini e Gino Pollini (1960-1964), the Siag factory designed by Angelo Mangiarotti and Aldo Favini (1962-1964), the Olivetti plant by Marco Zanuso and Eduardo Victoria (1969-1971) and the Kodak factory by Gigi Ghò (1972-1974), built with innovative techniques of prefabrication and featuring fast-setting concrete structures.

2. The context

After World War II, the positive relationship between engineering and architecture prompted prefabrication to take on a strategic role in the field of constructions, even in Italy, linking technological purposes, building processes and formal outcomes.

Such correlation of themes is essential to better understand how this profitable constructive season left important traces and led to important findings, although they often seem fragmented and disconnected.

In rebuilding this vast scenario, it would be significant to choose industrial architecture as a field of verification, or rather the emerging technological civilization in the post-World War II era, through which, with the words of Giuseppe Pagano (1942), we would have discovered:

"The ideals and lineages that are anything but occasional between modern engineering and poetry, between industrial standard utilitarian construction and functional architecture, rhythmically felt as pure expression of spatial relations" (Pagano, 1942). The 20th century factory holds and condenses the relationship between structural concept, technological process, and unexpected developments in the boundaries of design. It represents a genetically innovative place in terms of materials and constructive practices, which are explicit from its functional point of view, extraordinary in size and technologies; at the same time, it brings a new pattern for socialization, organization, and distribution of work with high territorial impact.

Furthermore, there are close connections between architecture and the context, assumed here as a reference to assess the impact exerted by prefabrication, as a byproduct of a more general great industrialization process, which inevitably, for better or worse, has altered the environment in southern Italy.

3. Method and research aim

The research method is based on a detailed study of the factories built in Terra di Lavoro in the second half of the 20th century. More specifically, we mapped the factories built between 1950, when the Cassa del Mezzogiorno was founded and 1970, when the mentioned industrial development was completed. These twenty years were a season of industrial growth supported by unprecedented investment in southern Italy leading to a positive impact both in social and economic terms (Conforti, 1997). In order to identify and study this selection of factories of the area, the research implied sources and information found in the designers, structural engineers, and general contractors archives.

All four cases considered in the follow-up of this paper show a very innovative notion of modularity in terms of prefabricated and installed elements. The construction of these factories is therefore in opposition to the traditional local building techniques and to a more handcrafted approach and the intensive use of hard work. The design of these factories is the result of the efforts of famous architects, engineers, and designers such as Figini and Pollini, Mangiarotti. Favini, Zanuso and Vittoria, Ghò who experimented new structural solutions based on the neat and coherent composition of the prefabricated elements (Barazzetta, 2004).

This research has revealed a strong territorial link between the Terra di Lavoro and Milan, Europe and even the United States. Every factory built directly by companies and designers from northern Italy in the twenty-year period of the Cassa del Mezzogiorno have shown advanced structural techniques, allowing prefabrication to debut in this rural area.

4. The industrial plan in Terra di Lavoro. Innovation over tradition

With the establishment of the Cassa del Mezzogiorno, in 1950, these natural communities got hit by an exceptional process of innovation. In the region between Naples and Caserta, the service structures and large-scale architecture established themselves into historical monuments and traditional buildings, generating an urban palimpsest with a marked metropolitan accent. Under the force of neo-industrialism and entrepreneurial impulse, the new motorway and railway connections modified the centuries-old framework of the Terra di Lavoro ancient community (Boeri, Jodice, 1999; Corsi, 2005).

Those intensive modification of this territory and other depressed regions of southern Italy was provided essentially by the Territorial Plans for Industrial Development which included the participation of some of the leading experts in urban planning and was aimed at the creation of a distinctive homogeneous areas (Renzoni, 2012). The plan of Terra di Lavoro concerned Areas and Cores of industrialization and it was developed in 1962 by Tekne, a Milanese company directed by Roberto Guiducci, collaborator of Adriano Olivetti, with the participation of Umberto Dragone for the economic aspects and Paolo Radogna for the urban planning issues (Comitato Interministeriale per la Programmazione Economica, 1968; Tekne SpA, 1968). As in Basento valley in Basilicata or in the plain of Sibari in Calabria, in Terra di Lavoro the team designed development models to combine the agricultural vocation of these places with a rational industrial increase and an infrastructural strengthening aimed at stopping the progressive depopulation of the countryside and the migration phenomena. Among the first established Consortia, this area –from the suburban belt of Naples to Capua and Caserta– matched exactly the required criteria (Radogna, 1965; Guiducci, 1964; Parisi, 2011; Castanò, 2012).

The district of Terra di Lavoro –about 50,000 hectares– joined a constellation of more than thirty municipalities where an autonomous industrial development had already occurred (Mazzetti, 1996). Among the purposes of the new plan were also the planned works responding to the needs of the population, including the residential districts and equipment for education, health, and trade. Since the 1960s, thanks to the decisive impulse given by the establishment of the Consortium, industrial companies have been growing exponentially, building modern factories nearby the main routes of the area. Three main goals pursued by the ASI Consortium (the extraordinary intervention of the State, the distribution of companies in clusters, the breaking of the isolation of agricultural centres compared to Caserta and Naples) were the strategic lines that led in a short time to the creation of new factories throughout the belt of municipalities around Caserta (Adorno, 2017).

It was also for these reasons that companies such as Manifattura Ceramica Pozzi, Olivetti or even Kodak chose the industrial area of Terra di Lavoro as the ideal site for building their well-equipped factories, instead of the Neapolitan belt. These companies had an impact on the development of a fully modern society and on the progress of prefabricated building, presenting themselves from the very beginning as open to both highly mechanized industrial processes and bold structural forms of high aesthetic quality (Castanò, 2021).

5. Case studies

The onset of pre-fabrication: Figini, Pollini and the "Ceramica Pozzi" in Sparanise

The Working Group for the project of Ceramica Pozzi, to be built in an agricultural area of 850.000 m^2 (Fig. 1), consists of: Luigi Figini and Gino Pollini, designers of the urban and architectural project, Silvano Zorzi and Gianluca Papini for the design of the structures and the computation of the reinforced cements, the engineer Gaetano Borghi for the planning and the direction of the installation work, the engineer Vittorio Dessì, from Prebeton, for the installation and management of the special prefabrication construction site, the General Company of Real Estate in Rome, for the management of the shipyard and finally the engineers Roberto Guiducci and Fabio Misurarca, from Tekne to whom was entrusted the crucial part of scheduling and overseeing the work (Rabbi, 1964; Savi, 1990).[1] Without making any plea to local companies, in a time span of about four years, they achieved the goal of building an industrial complex which showed the most advanced technological criteria, enabling an intelligent and synchronized construction site, equipped with machines capable for lifting and transportation, and a single industrial facility for the production of concrete, in order to organize the almost simultaneous construction of the four production sections: paint, laminates, glazed materials, and ceramics (Fig. 2).

In their executive design, Figini and Pollini plan an ideal model of the factory-city, in which the material of the building fits into the natural element background. The coarseness of the faced cements, the stereometry of the warehouses, their clear and regular structural dimension, interact perfectly with the texture of the paths drawn within the pre-existing green areas. The spatial balance of the layout, symmetrical, neat, and allusively distributed

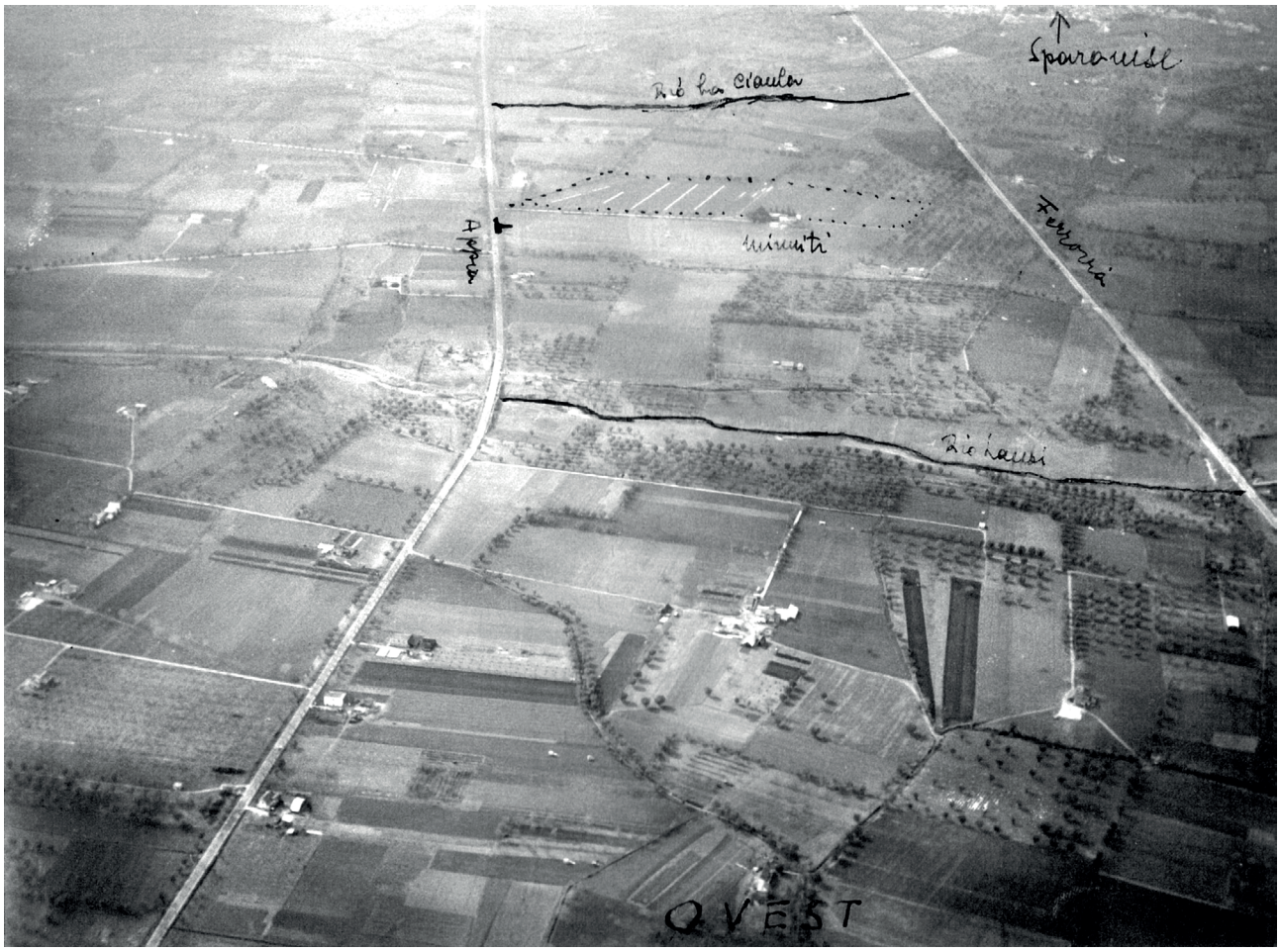

Figure 1 | Manifattura Ceramica Pozzi Factory, Sparanise, Caserta, 1960-64. Architects Luigi Figini & Gino Pollini. Photograph of the area with preparatory study of the project. (Museum of Modern and Contemporary Art of Trento and Rovereto, (Italy) – MART, Archive of the XXth Century, Archive Luigi Figini e Gino Pollini).

along the central axis communicates with the expanded services of each production area, each depending on the functional purpose. At the center of the formation, just beyond the entrance trilith, the large staircase signals the office building. Seemingly regular and rhythmic with an almost monumental appearance, it shows within the internal route a series of disruptive effects, marked by the concrete handrails, unexpected convergence points towards the base of the squared angles of the attic and from the alternating rhythm of windows and window-doors, from the long shadows of the upper overhangs. A traditional building where it is clear "the call of the South", evoked by Figini himself, intended as an inevitable attraction to the "Mediterranean architecture", much more critical in the definition of modern architecture. In Sparanise too, as it had already happened in Figini and Pollini projects in Ivrea, the quotations, the references, the organization, although declining towards a rationalist tone, do not intend to reject local models, at all. The reception buildings, designed as changing rooms, canteens, and offices, take the form of a true Mediterranean house; on two levels and in an isolated position, the autonomous solutions of the productive zones are alternated (Figini, 1936; 1950).

With different structural approaches as a result of either the timing (to allow simultaneous flow of the four constructions) or of the intended use of the individual compartments, each block presents different features, resulted from the use of prefabrication systems, precompression, or even traditional systems (Papini, 1965). In the paint compartment, for example, there is a system of coverage with illumination from above, which prevents direct irradiation, and it is at the same time a warranty of sufficient thermal insulation, allowing the maximum stacking of boxes possible near the walls. While the

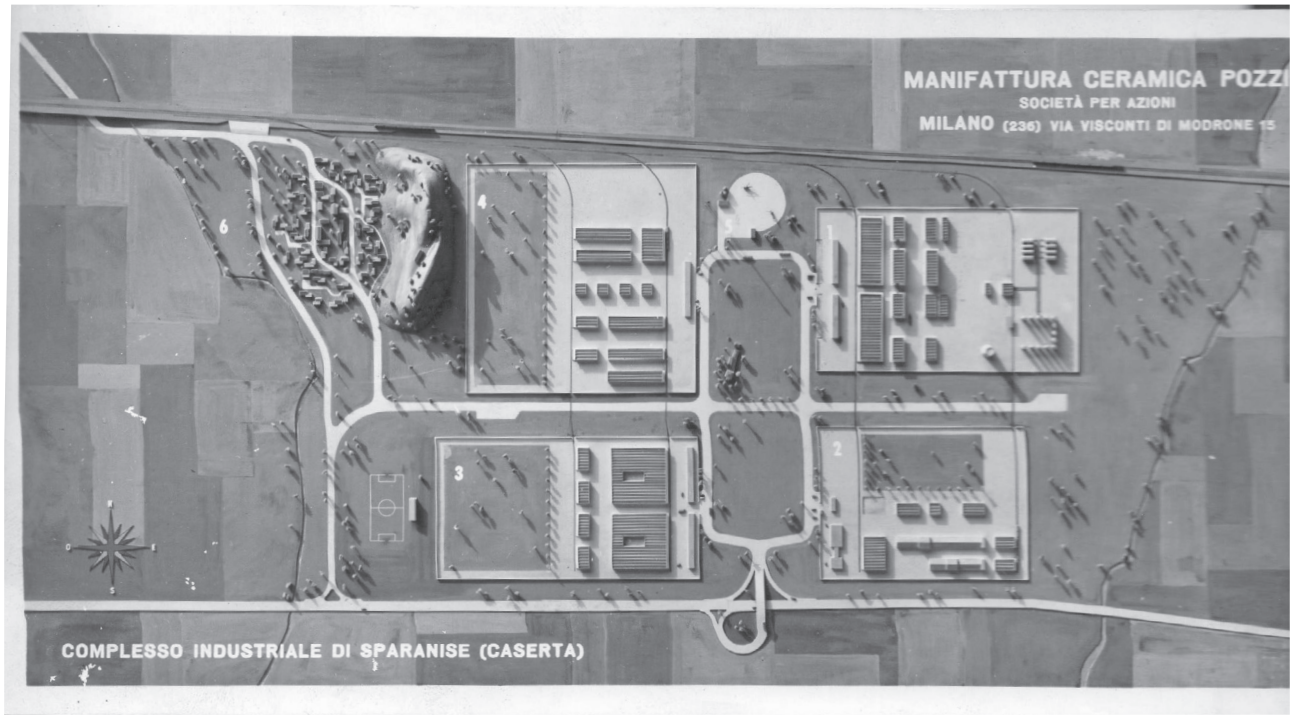

Figure 2 | Manifattura Ceramica Pozzi Factory, Sparanise, Caserta, 1960-64. Architects Luigi Figini & Gino Pollini, aengineers Silvano Zorzi, Gianluca Papini. View of project model. (Promotional postcard).

four-storey industrial buildings aimed to production are fully accomplished using traditional reinforced concrete-faced systems, the warehouses are consisting of two bodies adjacent to a single floor. For this reason, a cover of two overlapping layouts with a 'V' section and asymmetric arms, straight and upside down, is adopted in the pre-fabrication yard installed at the centre of the complex, transported during work, and joined to the holding beam, arranged in sequence at 5 m, along a constant opening between the supports of 20 m (Balbi, 1963).

The result is a constant ripple, which filters the sunlight inside, and reveals in the façade unexpected formal effects (Fig. 3). Strikingly, in this type of work cycle, a relatively low number of skilled workers was involved: 50 men to prefabricate the tiles and 15 to carry, lift and lay them. Numbers which testify the acceleration given to the construction machine, organized to articulate the work in separate segments of activity, allowing the production of elements to proceed in sequence with their rapid commissioning (Giay, 1964).

The system used for the more than ten single-storey buildings of the rolled and calendared sectors is made up of simple pre-stressed reinforced concrete 'T' beams, prefabricated in metal formwork. Lastly, the ceramic group, which constitutes approximately 40.000 m^2 of the built-up area is the most important construction entity, requiring, especially in the two main major units, special technologies for the loads of equipment and the cycles of production. It is distinguished by the simplified use of a frame composed of pillars, main beams of connection thrown on site and a dense warp of secondary beams prefabricated in simple prefabricated concrete, with the task of supporting transport chains; the crowning element is a flat roof with discontinuous sheds (Gregotti, Marzari, 1996).

The module, the chassis, the structural junction according to Angelo Mangiarotti

In 1962, just two years later, in the stretch between Teverola and Marcianise, still in *Terra di Lavoro*, new pavilions were installed, designed by Angelo Mangiarotti and Aldo Favini for the processing of hemp and chipboard by Siag, the Italian company which produced agglomerates of vegetable or mineral substances. On the construction site, for the first time, there is an effort in transposing the industrial technologies of prefabrication within the productive contexts of the artisan imprint of Southern Italy (Burkhardt, 2010; Castanò, 2017). Although dissatisfied with the manpower and the final quality of the cement on view, he recognized the positive value of this cooperation which was already included in his first project's great constructive and formal simplification (Castanò, 2016).

Figure 3 | Manifattura Ceramica Pozzi Factory, Sparanise, Caserta, 1960-64. Architects Luigi Figini & Gino Pollini. Detail of the prefabricated structural system of the paint compartment. (Photo: Carlo Orsi. Museum of Modern and Contemporary Art of Trento and Rovereto, Italy - MART, Archive of the XXth Century, Archive Luigi Figini e Gino Pollini).

The complex is organized in two separate zones, on the model of the coeval Olivettian architecture: one intended as the employees' lodgings, offices, and services and the other aimed to the production warehouses. Bending the most up-to-date constructive techniques to the local language, to the natural vocation of the site and to the climatic habits, he conceives an anonymous architecture which is strongly integrated with the landscape (Fig. 4).

As it had already happened with the *Mater Misericordiae* church in Baranzate and in the Padua depository by Bruno Morasutti and Aldo Favini, even in Marcianise, the large dimensional scale never exceeds pure mechanism and does not allow formal digressions. In this project, the prefabricated elements, intended to mark the different parts individually, draw architectural containers in which the attention to detail distracts from the observance of the function. Once the technical capacities have been crystallized, the materials are modelled in original and permanent expressive solutions able to transform the ideal reproducibility of the archetype in a precise syntax, neat, free, which each time is simplified and replicable (Mangiarotti *et al.*, 1987). To the question posed to him in 1963, while the Siag was under construction, referring to whether the industrialization of the construction industry (meant as an operation of use and assembly of intermediate products) could limit the creative activity of the designer, Mangiarotti stressed without hesitation: "As it is, even before it was a practical system and the most consequent transformation of the constructive process of our time, it must be understood as a new figurative principle"(1963) (Fig. 5).

The process that governs the work thus passes from the elaboration of the single building components up to their integral interaction, in a sort of impeccably formal neo-craftsmanship that aims to overcome the traditional approach "in bluntly industrialized terms" (Mangiarotti, 1963).[2] The modular approach, a true generator principle, allows a theoretically infinite number of combinations composed in an almost automatic way (Graf, Albani, 2015). In this sense, Siag is a paradigmatic construction project for more than one reason. Above all, because of its minimal spatial element; the frame, in its isolated form yet, is a complex and significant entity, with its own autonomy and internal development, created to associate itself with the other components. Secondly, the aggregation process between the parts, moving in the direction of a figurative element, typical in Mangiarotti's language, transforms the mass-produced virtuosity into expressive eloquence. Finally, the invariance of fixed and determined structural connections allows the moving parts to have a sort of "automorphism" and adaptation, favoring a high number of combinations, depending on the functions. "There is here", writes Mangiarotti while commenting the work: "A consistency between work, place, architecture, method, destination, which increases the value of each of the terms and the whole ensemble and makes the company" (Mangiarotti, 1964).

The starting point of this experience, punctually described by Mangiarotti himself in the articles written for the presentation of the project, is the same wood panel reconstituted and composed of natural fibres ("The final product of this industry"), from whose dimensioning: "The modulation of the concrete, prefabricated, structure starts, both in the group of industrial buildings and in the houses connected to the plant". Thanks to this fundamental element, the spatial organization loses its eminently tectonic character to acquire value in the procedural categories of flexibility of use, constant variability, and possibility of increase: "Prerogatives and themes of the architect's research and work, both in architecture and in industrial design" as he wrote (Mangiarotti, 1964). Residency and service spaces unfolds into a free

Figure 4 | Siag Factory, Marcianise, Caserta, 1962-64. Architect Angelo Mangiarotti, engineer Aldo Favini. View of the factory (Photo: Giorgio Casali. Archives of Angelo Mangiarotti Foundation, Milan, Italy).

and uninterrupted proliferation of connections governed by an implicit order that regulates its development. The mathematical ratios, symmetry and balance are virtually part of the initial unit, precisely fixed by the panel –93 cm long and 210 cm tall– repeated seven times, which stands as the base module of a 6.51 m per side grid. The layout reproduces an 'L' system made of two rectangular arms, each coming from the regular addition of three aisles on the short side and eleven on the long side, whose point of intersection focus the attention on the great emptiness of the wooded patio.

Inside the vertical structure of the frames, simple in its geometry and coherent in its materials, the cruciform pillar, manufactured on site, acts as the primary element of connection, orienting the layout of the main beams equipped with indentations as a lodging for the prefabricated secondary beams with 'T' sections and brick slabs (Mangiarotti, 1963). Enrico Davide Bona says: "The essentiality of this joint is obtained through its geometric, functional, constructive, and formal analysis. The cross in the section absolves the purpose of granting functional stiffness in all directions, suggesting the orientation of the beams, sculpting with light, shadow, and scope effects all at the height of the pillar" (Bona, 1988).

It is, however, designed to fit directly in the land, so that the rain falling inside the crossbar can drain water into the soil, as already experienced in Pozzuoli by Luigi Cosenza. At the back of the structural grid, the panels, made of four types (fixed, openable, and clear, fixed, openable, and opaques) whose fragments are left nowadays, would then define in different ways the inhabited perimeter, according to the over 48-solution abacus studied by Mangiarotti. The floor of the entire building is made of square travertine slabs, 93 cm per side, alternating with paths of stones which interrupt the continuous sequence and give rhythm to the crossing, amplifying the perception of space like fragments of a Japanese garden.

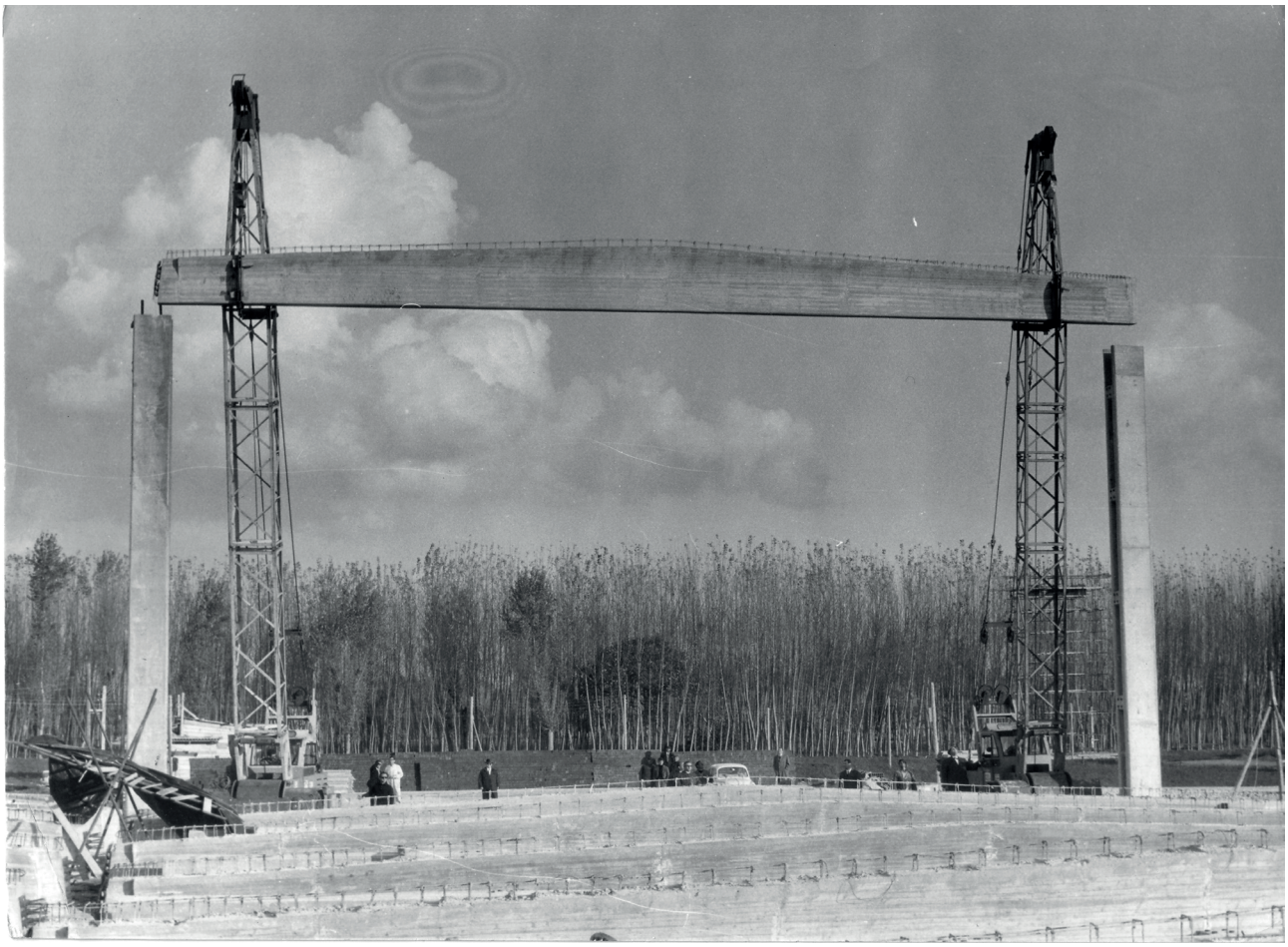

Figure 5 | Siag Factory, Marcianise, Caserta, 1962-64. Architect Angelo Mangiarotti, engineer Aldo Favini. The prefabricated system of the factory (Photo: Giorgio Casali. Archives of Angelo Mangiarotti Foundation, Milan, Italy.)

The main residency and services body is divided in warehouses and production compartments. The outgoing 186 cm long and 240 cm tall, prefabricated panel is used here only in the opaque version.

The structural mesh with a 6.11 m inter-axis (three panels for each span plus the footprint of the pillar) has a wide transverse opening larger than 20 m, secured by a pre-compressed 'T' shaped beam. Both warehouses, due to the sequence of nineteen 5.80 m tall frames (seventeen 11.60 m tall frames were found in the original plan) are made of two contiguous bodies along the east-west axis while the machinery department, isolated with a single bay, consists of just six frames of the same type.

For the load bearing structure, in collaboration with Aldo Favini, who was meanwhile experimenting with prestressing, Mangiarotti thought of an original trilith shape made of two thin concrete partitions connected to each other to form the pillar, conveniently freed at the extremity to allow the lodging of the prestressed beam.

As he explains: "[The structure] has a variable section and it is particularly studied according to the efforts, prefabricated on site as the pillar is prestressed". A constructive system reduced to the minimum; two pillars, a main beam and a slab covering the 6.11 m by 1m cemented slabs, repeated indefinitely in the two directions of the floor with different heights. It represents a rather recurring procedure in industrial construction but in this case, it undertakes, as noted by Bona: "An architecturally precise meaning that provides every detail, modelled, in fact, on this possibility" (Bona, 1966).

From this moment on, Mangiarotti begins to elaborate its poetic norm. Not in the sense of a purely mechanical concession to technology but based on the order which the new and extraordinary means is able to provide.

Figure 6 | Siag Factory, Marcianise, Caserta, 1962-64. Architect Angelo Mangiarotti, engineer Aldo Favini. View of the housing and services area (Photo: Giorgio Casali. Archives of Angelo Mangiarotti Foundation, Milan, Italy.)

From the structural bonds, the internal geometry, and the design of the component parts, descend the spatial relationships of the ensemble, the functional reasons, the complementarity between light and shadows (Fig. 6).

Here, Mangiarotti seems to face a purely technical challenge, playing with few basic architectural components. The initiation to modularity and composability has always been congenial to new design systems. More flexible, neater but at the same time inclined to communicate with the artistic and aesthetic research, concerning both home and factory planning in the second half of the twentieth century. For Mangiarotti, industrial architecture became the ideal place where reinventing countless times the reinforced concrete frame was possible, as well as encoding a rich vocabulary of structural shapes which shows a logical coherence between constructive process and formal expressivity (Santini, 1971; Graf, Albani, 2019).

Figure 7 | Olivetti Factory, Marcianise, Caserta, 1968-70. Architects Marco Zanuso & Eduardo Vittoria, engineer Antonio Migliasso. South view of the production sector. (Photo: Gianni Berengo Gardin. Historical Archive Olivetti, Ivrea, Italy.)

From the south of Caserta two exemplary factories: Zanuso's Olivetti and Vittoria and Ghò's Kodak

After just six years, we should clarify those radical positions. Between 1968 and 1970 Olivetti started the construction of five production units: three in Scarmagno, one in Crema, another one in Marcianise (Castanò, 2020). Marco Zanuso and Eduardo Vittoria, joined by Antonio Migliasso for the evaluation of the structures, led the design office. Programming and direction were led, once again, by Tekne. Each step of the prefabrication was followed by the Milan based company Bonomi & Vecchi. Pietro Porcinai designed the greenery (Fig. 7). They explored the possibilities of new technologies, sought an excellent standard, experimented with mass-production (Dorfles, 1971, 1982; Dal Lago, 1982) and brought together programming and integrated planning, the building and the bespoke site, the economic optimization, and the speed of execution (Barazzetta, 2011). For the new Olivetti factories in Marcianise, Zanuso and Vittoria looked at Angelo Mangiarotti rather than Luigi Cosenza. They drew inspiration from the construction processes applied to the nearby Siag factory (Porta, 1982).

Zanuso himself wrote: "For this reason, the project is devised as a flat, horizontal layout, with scattered light sources and macro-blocks of, modular objects linked one to another, powered by energy towers and the towers in turn are supplied by a common power station. A sort of castle whose towers instead of being defensive, are energy towers" (Valeriani, 1995).

The framework in reinforced concrete, set on a 18×12 m grid, is marked by the giant tree-shaped pillar embedded in his base. The pillar, tapered on top to better hold the main beams is a pre-compressed inverted 'Y', and the secondary beams show a triangular section closed by the lower vertex; an original system of triliths, integrated with the floor, which above all ensure an high load-bearing capacity and a fast assembly (about 500 m^2 per day) while

Figure 8 | Olivetti Factory, Marcianise, Caserta, 1968-70. Architects Marco Zanuso & Eduardo Vittoria, engineer Antonio Migliasso. View of the pillar-tree. (Photo: Gianni Berengo Gardin. Historical Archive Olivetti, Ivrea, Italy).

revealing a high quality and elegant design (Frampton, 1999; Crespi, 1999). The result is a seamless space where each area is linked to another and where there is any partition between the two-level offices, the working areas, the cafeteria, and the full-height metalworking laboratories. Even the roof, designed on site by a young Renzo Piano, supervised by Zanuso, is completely walkable and crossed by beams and plumbing systems which are left exposed, showing anodized skylights (Quadrato, 2022). New shapes and new expressive codes were born from Olivetti's technological findings, suited to the industrial aesthetics. In the same way that the flexibility is tested, the modular coordination gives the following processes of prefabrication the correct outcomes (Grignolo, 2013) (Fig. 8).

This is particularly clear in the final case, namely the Kodak plant built in Marcianise between 1972 and 1974, designed by Gigi Ghò and Aldo Favini, with the involvement, for the first time, of a local company, the I.C.L.A. in Naples, recruited to manage the prefabricated construction site (Quadrato, 2022) (Fig. 9). The Kodak building summarizes the variable and constant factor described in this brief industrial architecture review: from the cross iconography borrowed from the Olivetti in Pozzuoli to the plastic and reinforced concrete details of the Sparanise examples; from the iconic connotations given by Mangiarotti in Marcianise's modular paths and rhythms to the layered modularity experienced by Zanuso and Vittoria, here enhanced by the unique shielding in reinforced concrete *brise-soleil* (Ventura, 1997; Barazzetta, 2011; Ghò, 1978).[3] For Ghò, indeed, but mainly for Favini, the rendering of the elements *in situ*, made possible by skilled firms, provided a guaranteed rejoining of architecture and technique, through the control of the work, the planning of the construction site and the gradual expertise of the workforce (Torricelli, 2004). On one hand, the mirage of industrialization, embodying the ideals of a widespread liberal culture, strived to lift construction workers to skilled technicians, likewise what was

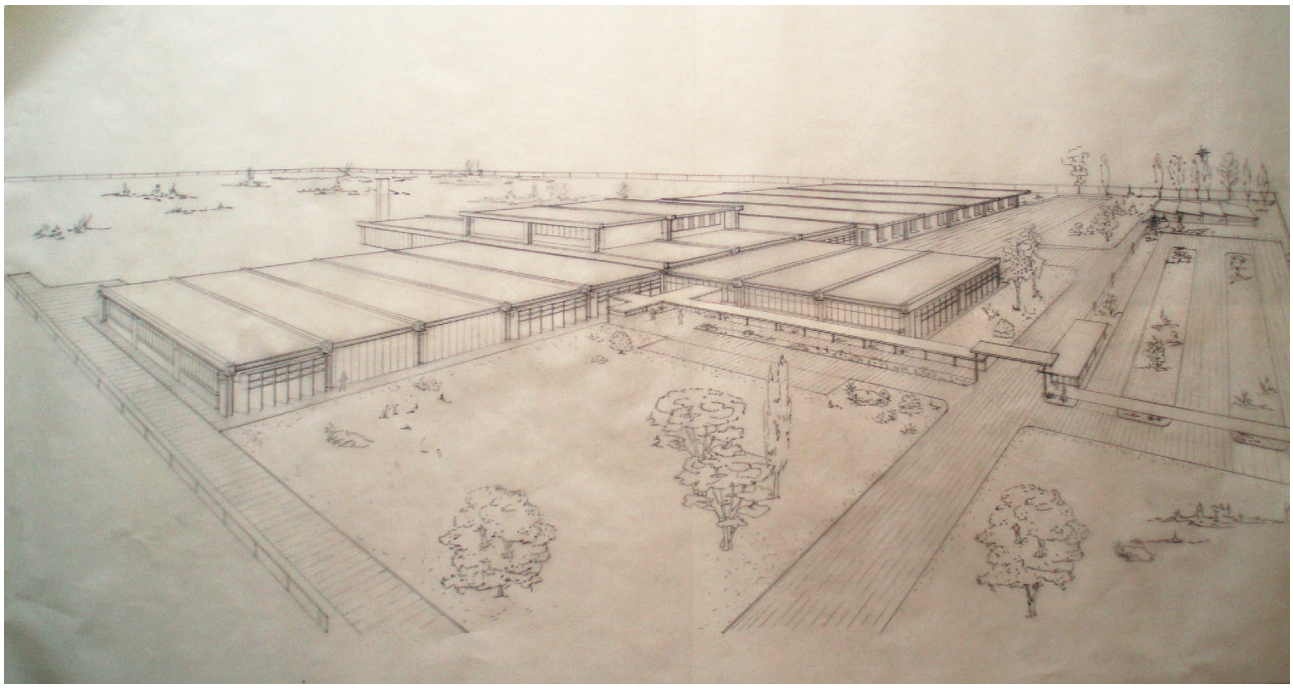

Figure 9 | Kodak Factory, Marcianise, Caserta, 1972-75. Architect Gigi Ghò, engineer Aldo Favini. Perspective view of the plant. (Gigi Ghò digital Archive - https://www.archiviogigigho.com/stabilimento_kodak_marcianise.html).

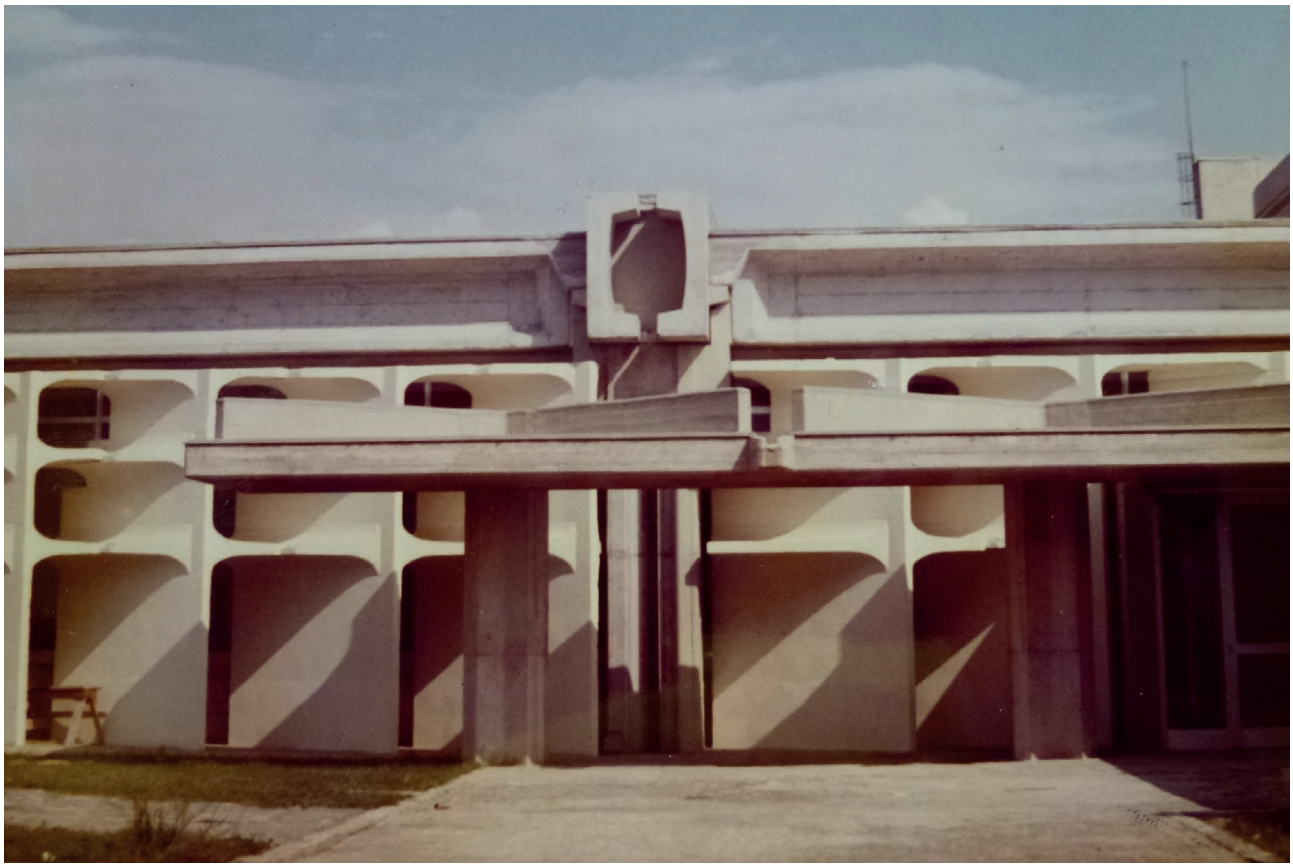

Figure 10 | Kodak Factory, Marcianise, Caserta, 1975 ca. Architect Gigi Ghò, engineer Aldo Favini. Photo of the pillar-beam system. (Ex Kodak Archive -Marcianise).

Figure 11 | Kodak Factory, Marcianise, Caserta, 2020. Architect Gigi Ghò, engineer Aldo Favini. (Photo: Gino Saracino).

happening for a multitude of labourers, on the other hand it has converted them merely into workers (Fig. 10). At the very begging, the structural and formal experimentalism of prefabrication attempted to prevent the fearsome effects of an uncontrolled commercialization of industrial elements and components, something that would happen in the future. This is the reason why it will still be interesting to continue this research (Fig. 11).

6. Conclusions

This insight occurs from the revived interest in studies about prefabrication in Italy between the 50's and he 70's and about the new aesthetic outcomes related to it. It is also intended to help evaluate the qualitative connections between construction, geography, and labour, assessing the friction between the advanced products and knowledge imported from northern Italy and the agricultural vocation of the southern regions. The paper also links the outgrowth of prefabricated systems in the less-developed area of southern Italy to the wider context of the great industrialization, boosted by political decisions and the State financial aid, thanks to the 'Cassa per il Mezzogiorno', which covered the costs of industrial reconversion in the Campania region as well. At the present time, this research has revealed the importance of the industrial buildings studied in this paper which have been included in the National Census of the Italian Architectures of the second half of the 20th century, curated by Italian Ministry of Cultural Heritage and Activities and Tourism – MIBACT.[4]

The study of these exemplary factories allows us to deepen the experimentation in the field of prefabricated structures designed after World War II. Architects, engineers, and avant-garde companies such as Tekne started an unprecedented process of innovation by creating reinforced concrete components designed as autonomous and intelligent structures, with elementary shapes and low-cost production. The spatial configuration of these systems depends on construction choices such as the simplification of assembly and disassembly of components, lightness, flexibility, transformability, cost-effectiveness and, finally, formal quality. The possibilities offered by mass-production in those crucial years allow a

large use of these solutions, based on the quality of each single piece, on the degree of technological complexity of the finished goods, on the assembly options. These are the first real efforts to rationalize the building sector, combining the research of the most up-to-date Italian designers with the pioneering research of Jean Prouvè, Konrad Wachsmann and Charles Eames. Their trilithic systems are flexible, combinable, and recombinable open systems. The standardized factory is intended as an open structure, consisting of various parts that can be expanded and added, repaired, and replaced according to a scheduled cycle. Such flexible structures offer professionals in northern Italy the opportunity to remotely control several southern construction sites, to speed up the assembly operations of the components and to transform the spatial and functional configuration with simple technical tasks. The production of prefabricated frames thus becomes the central theme in the factory design and the technical culture of this new era in architecture.

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