Producing Project

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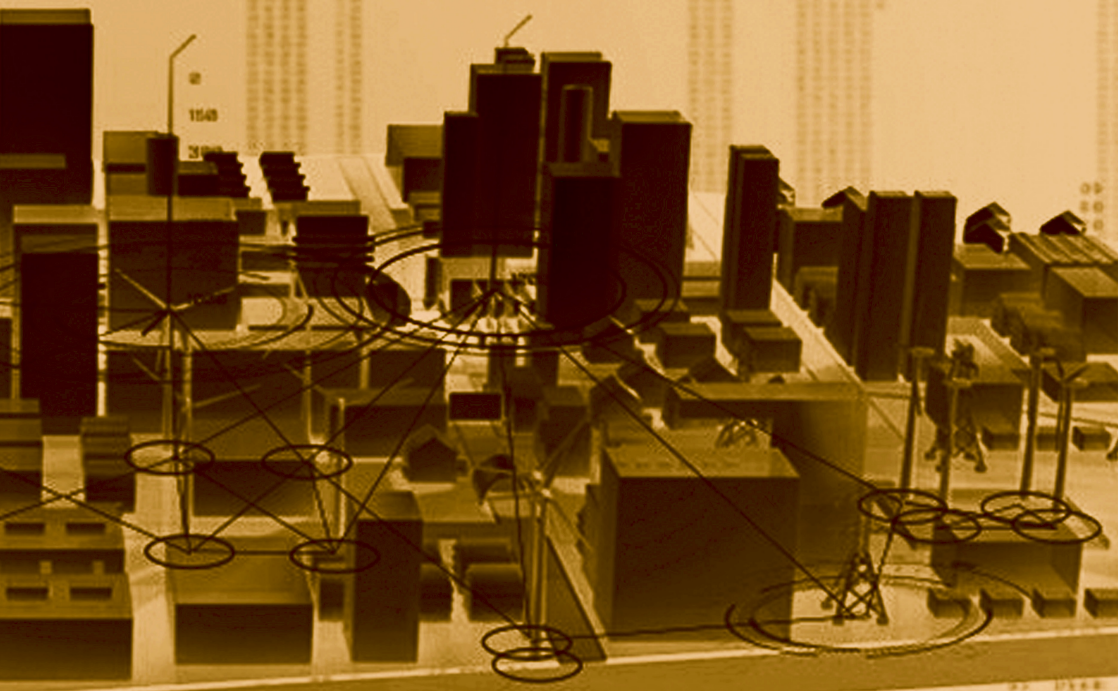

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The transformations created about the design activity by the several challenges started by the economic crisis, climate change and environmental emergencies, together with the impact of the Web and ICT on social and productive systems, highlight many critical issues, but also significant prospects for updating concerning places, forms, contents and operating methods of "making architecture", at all levels and scales.
In this context, the cultural tradition and disciplinary identity of Architectural Technology provide visions and effective operating practices characterized by new ways of managing and controlling the process with the definition of roles, skills and contents related to the production chains of the circular economy/green and to real and virtual performance simulations.
The volume collects the results of the remarks and research and experimentation work of members of SITdA - Italian Society of Architectural Technology, outlining scenarios of change useful for orienting the future of research concerning the raising of the quality of the project and of the construction.

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3.4 TECHNOLOGICAL DESIGN AND SOCIAL INNOVATION

Tiziana Ferrante[*]

Abstract

The Architectural Technology has always proposed a correct approach to design, considered as the core of the building process, by identifying appropriate tools in order to manage its complexity. Such tools are even more valid today in the perspective of a new social demand and a transition of the building sector to Industry 4.0. However, this is jeopardised by the budget cuts in welfare and the University: professional degrees and industrial doctorates are not enough. It is therefore more often necessary to refer to a technological design culture based on the responsibility of the designer and on the relationship he/she establishes with the social context, the clients and the company.

Keywords: Technological design, Social innovation, Industry 4.0, Education

The topic of the "design culture" and its responsiveness today to a new economic/social demand requires a preliminary consideration on how education can then be translated into a correct and appropriate design approach, as well as Architectural Technology has (always) proposed (Schiaffonati, 2011).

The latter is a disciplinary area that has always considered the "centrality of the design" as fundamental and for this reason located "inside" the building process, thus rediscovering precise links with each phase and identifying adequate tools and methodologies within that in order to manage this complexity that is normally a constant factor.

Over the years, the Architectural Technology has carried out a significant cultural and social innovation action, considering architecture as a tool of civic response to problems, the definition of solutions to problems of emergency housing arisen from migration, the response to seismic events and/or environmental disasters, in addition to the constant aging of the population together with a similarly constant increase of homeless people, in conditions of poverty.

The concept of social innovation has historically involved not only technological innovations themselves, but also the transformations of living environments and social structures - as Bellicini of Cresme reports when he states that it is the second industrial revolution in construction, after that of reinforced concrete in

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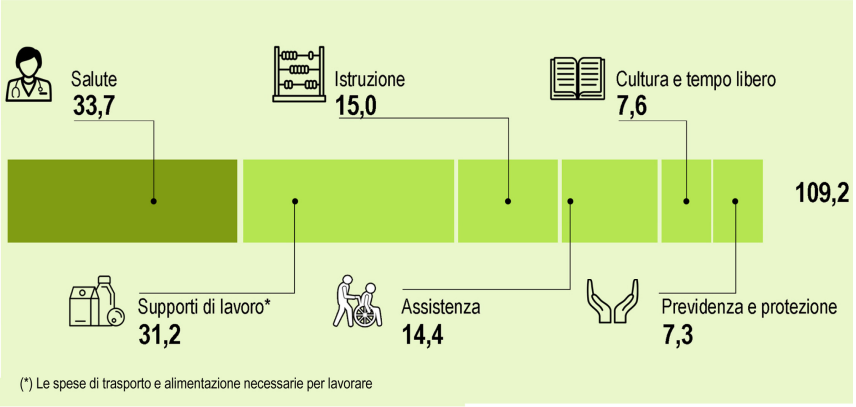
1850 and it is made of digitisation of design and building process, new materials, new measuring instruments, new construction technologies, renewable energy.

The supply models and the demand behaviours are reconsidered (Arona, 2017) and, consequently, the technological approach to the architectural design plays a key role because «Architecture itself often represents a communication tool "of" and "for" the social innovation; likewise, social innovation changes (also) through the architectural act. Architecture, together with the range of elements that make up the city, identifies tangible material translation as a result of the socio-economic needs» (Faroldi, 2017).

Such economic and social needs, for example, concern the severe shortages detected in the welfare sector during in the last few years, whose system imposes a step ahead: currently it costs to households 109.3 billion per year, equal to 6.5% of the Italian GDP[1].

Moreover, the increasing difficulty of access to services, detected in the growth of households who give up their services (equal to 36%), reports that for a family with an average income the cost for welfare is the third item of costs after food and home (Graph 1).



Graph 1 - Spending on welfare of Italian families (Data in bilions of euro). Source: Mbs Consulting, Observatory on welfare balance of Italian families, 2017.

The discipline of the Architectural Technology has therefore promoted and exploited research in the construction areas of universities, hospitals, socio-health facilities, schools, etc., as well as conducted surveys (Performance Design) and established Research Doctorates (monodisciplinary, interdisciplinary) and Masters (on management, technical-administrative procedures, BIM) in order to address clients, construction companies, public administrations.

[1] Mbs Consulting Observatory on the welfare budget of Italian households, November 2017, http://www.uil.it/documents/RAPPORTO%20-%20osservatorio%20welfare%20familiare.pdf.

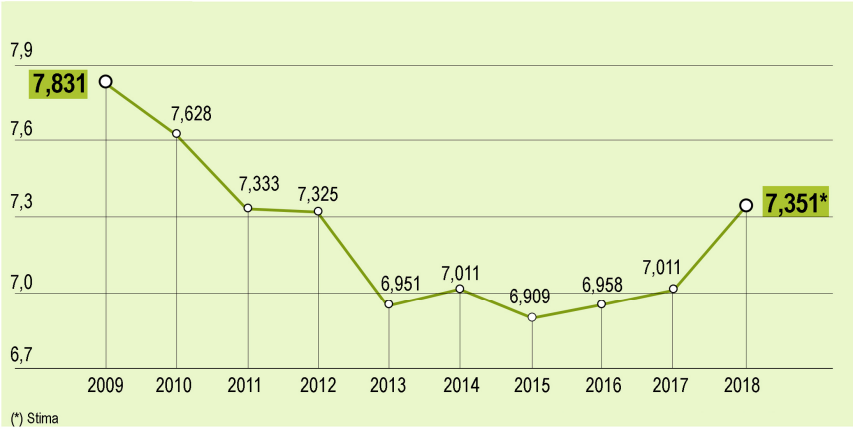
All this is today jeopardised for a progressive reduction of the university educational/training courses despite the growing demand from the production sector. Given that the education/training of graduates (in Architecture, but not exclusively) cannot only aim at achieving skills required in the labor market, it is (and will be) more often relevant a focus on continuous education/training, e.g. innovative Research and/or Industry Doctorates carried on in close cooperation with enterprises. Education/training cannot therefore include any form of obsolescence and must not even be based on information gathering (which, in any case, cannot bring a solid knowledge), but must aim at building a flexible structure able to fit, from time to time, the different occurring contexts.

Education/training, especially when related to Industry 4.0 and the job market, will become more central in Italy in the next five years. This is not only to boost the economic and productive recovery, but also to tackle unemployment, with a priority for young people. From now to 2022, in fact, as from annual Excelsior report by Unioncamere and Anpal, more than 2.5 million workers, both employees and freelancers, will be required. Thus, more than 70% of these new entries - say 1.8 million workers - must possess quite high and qualified skills (for 35.8% we mention specifically high skills or specific and technical professions) (Tucci, 2018). Meanwhile, the professional degrees are being launched.

ANVUR (National Agency for Assessment of University and Research System), CUN (National University Council) and the Ministry of Education approved professional degrees for the AY 2018-2019 in 15 universities; these aim to train professionals in the approach of Industry 4.0 and establish two years of traditional study and one of practice at professional firms or companies.

Therefore, in order to comply with this, it is necessary to avail materials, equipment and laboratories, but this is a rare situation within our faculties, more often facing severe critical issues. The Italian university work market is often “precarious”, just looking at the teaching staff we can detect an average of less than two temporarily hired researchers every ten retired permanent professors/researchers. Most of the temporary research staff/groups include grant holders, doctoral students and scholarship holders: a variety of contracts whose figures are not always known: MIUR provides fairly updated data on the first two categories (13.350 grant holders in 2017 and 31.651 doctoral students in 2015), while the figure of scholarship holders is even unknown.

However, the graph clearly shows the discrepancy between the new staff commitments and the budget reduction through the last decade (Graph 2).



Graph 2 - Ordinary funding of Italian Universities. (Data in bilions of euro). Source: Ministry of Education, University and Research, 2017.

The emphasis of the cultural contribution to the design disciplines by Architectural Technology was always on promoting the awareness that the relationship between design and construction is a complex matter to be managed with competence and appropriate tools[2]. However, here we face the (unsolved) problem of the integrated procurement, a source of continuous conflicts.

The builders of the ANCE (Confindustria) and the National Association of Municipalities (ANCI) aim to a return to the integrated procurement. One of the main innovations of the 2016 Code was the obligation to contract building works on the basis of the executable project, as in the Law Merloni 1994 after the Bribesville age, in order to reduce the post-tender disputes and the work variations. ANCI and ANCE, however, report difficulties, especially in the case of small municipalities, in designing, and therefore require to go back to the free integrated procurement, i.e. to provide that contracting entities can entrust building companies on the basis of executable design and working plan as a result of the final design already approved (Arona, 2018).

Also, OICE (Association of organisations of engineering and architecture, that includes 350 companies, with annual profits of 2.4 billion and 17.000 employees, 85% of them technicians) reports that the integrated procurement is not a useless procedure, as the president Scicolone points out: «We only disagree with a generalised application of the integrated procurement».

Therefore it is necessary to address a technological culture (not technical, actually) of the design based on the responsibility of the designer as to the relationship with the social, economic, environmental context through correctly in-

[2] Excelsior Unioncamere and Anpal report, 2018, "Excelsior information system. Forecasting employment and professional needs in Italy in the medium term (2018-2022)".

terpreting the "demand", on ability to feedback and support the client in identifying procedural paths appropriate to the nature and relevance of the interventions, as well as providing assessment tools for possible alternatives in the planning and programming phases (ex ante methodologies, feasibility studies), on ability to combine the different phases before and after the design development (ex post methodologies), on inescapable necessity of defining, as regards to the relevance of the interventions, the financial coverage and at the same time the work completion timescale, with the ability to interface directly with the building company to monitor the executive phase.

The designer's responsibility is involved in three themes: the first theme is "design, sustainability and circularity of processes" with the aim of reducing the consumption of raw materials and limiting the environmental impact and the circularity of processes, by reducing the erosion of the natural asset through waste disposal and cyclic use of raw materials, as a (definite) industrial reference context would establish; the second is therefore "design, digitisation and Industry 4.0"; finally, the third is "design, uncertainty and resilience" to deal with economic/social and environmental crisis (Campioli, 2017).

Facing the need of such skills, Architectural Technology firstly introduced methodologies able to interpret the social dimension of architecture through the performance-based approach, disclosing it in the definition of metaprojects, performance specifications, lines and/or design guides, feasibility studies, in order to guarantee the viability of an intervention.

The law-maker recognised such content as founding (and fundamental) prerequisites of the "technical and economic feasibility project"[3], in the definition of objectives, in the identification and analysis of all possible alternative design solutions in relation to the territorial, environmental and landscaping context in which the intervention is inserted, to the impact on environment and the specific needs to be satisfied and the services to be provided. This means that a predictive action starts and develops from feasibility (Del Nord, 2011), so that the designer brings it along with a design consisting of detailed analysis and targeted evaluations, where no component can be underestimated or excluded.

On this purpose, the role of Architectural Technology with regards to the "design culture" can still provide many responses in terms of social innovation because it has always been respectful of meeting the needs of the community (Palumbo, 2012), through the practice of those forms of participation currently of great interest in the development of programs and projects of services and infrastructures.

Such participation must not be limited, as it is currently, only to some works and only at one process stage with the *debat publique*, but it must be constant and open to all according to the open source policy.

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[3] Art. 23, D.Lgs 18.04.2016 n. 50, "Levels of design for procurement, for works contracts as well as for service".

In the participatory process, the Post Occupancy Evaluation (POE) is particularly relevant in the current time when the real estate sector cannot propose itself "only" through sale, but also with the offer of additional services (including those to the person). In fact, Industry 4.0 goes beyond and offers the opportunity to evolve and change operating models: in this context, companies can reconsider their production chain according to policies very different from the past, allowing to create business models with greater acceptance and therefore loyalty policies for customers. Thus, enterprises can change from product companies into "product as a service" companies. Just for this reason, after years of indiscriminate budget cuts to the research and innovation sector, which instead is fundamental for the competitiveness of the country and its industry, it is now necessary to promote a coordinated research plan based not only (as it happens today) on a competitive basis, but on strategies for restarting the collaboration between industry and university research in strategic sectors, for the benefit of the community, in order to harmonise research with social innovation.

From the launch of Industry 4.0, much is expected from the competence centres (at the moment there are eight competence centres admitted to the negotiation phase with the Ministry of Economic Development to access public funding) that will be research facilities and technology transfer "4.0" with public and private partners. They will develop projects in certain areas of specialisation and shall provide services to SMEs. Overall, there are about 400 companies in alliance with about seventy universities and public research organisations, using the Third Mission as a driver of social innovation and as a bridge to fill the gap between science and society, transforming universities, research centres and scientific institutions into drivers of change. The integration of the different instances of companies, industry, work, government, universities and civil society - to the largest extent - is exactly what we need now.

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