

Construction Technology in Serbian Context-Dealing with a Challenge

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Abstract. Contemporary architectural practice shows redefined position of construction technology, which becomes interwoven into essence of design process, known as concept. Strong relation between construction industry and architects becomes evident in day-by-day update of available construction technologies and demonstration of new materials application. In our context, the position is opposite, and what once was strong and highly developed construction industry, resulting in prefabrication and related design process, now is fragmented and underdeveloped sector. In such conditions, practice shows several anomalies regarding application of construction technology, which we define as light modernized, mutant and quasi-modern. Coping with the issues presented, we anticipated strategy that will primarily affect education of future practitioners, since the turbulent market realms are out of reach at the moment. Stretching the education between construction and design, we will seek for integral line of designing and thinking. Consequent shifts that are envisioned for the future would not only affect quality of the construction industry and its modernization, but benefit the final user as well.

1. CONSTRUCTION INDUSTRY-LOST HERITAGE

Construction industry is regarded as a leading branch of industry, counting for between 5 and 10 percent of the GDP of industrialized nations, technologically sophisticated, research oriented and constantly catalyzed by leading edge architectural design (Fernandez, 2004: p.55). In former Yugoslavia that was the case, in times of widespread state investment in building and housing. That reinforced the constant need for investment in construction industry that fostered state policy for quick, efficient and comfort housing. Prefabrication came as a result of development of unique structural systems that optimized quality and efficiency of construction sector.

During the past two decades, faced with problems of economical recession and turbulent privatization of state property, construction industry became obsolete. Fragmentation of the country which once was unique and needy market left many of the manufacturers oversized, isolated and unprepared for new realms. In this period, private investors emerged and most of them did not have financial power for large scale building investments. The construction process downgraded to the level of crafts, with cheap labor and traditional and slow construction techniques.

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2. CONTEMPORARY ARCHITECTURAL PRACTICE AND TECHNOLOGICAL REALITY

Caught in isolation and with limited resources, architectural practice faced serious challenges in constant struggle for its own existence. The adoption of uninventive architectural design and suspicious architectural language came as a consequence of such conditions, additionally suppressed by outdated construction technology.

“In contemporary architectural production, position of technology in design process is promoted, from the point of applying technology to the point of expressing technology” (Dinulovic, 2007. p.176). This is even more strengthened by overall appeal for sustainable building, which, as a model of thinking and designing, includes high-technology. While European architectural production shows signs of constant development of construction technology to satisfy the needs of progressive design concepts, in Serbian context this is demoted to the level of simple and usually uninventive application of existing elements. “Of course, it is worth noting that there are very good reasons why buildings continue to be made of the same materials used by Vitruvius, Bru-nelleschi, and Palladio. Concrete, timber, and masonry have all been improved in one way or another, but their use in buildings persists because they are inexpensive relative to their unit of service (be it compressive, tensile, bending strength, and so on)” (Fernandez, 2004: p.56). Given the situation where the application of any material that goes outside of the already narrowed construction material pallets includes costly procedure of importing, the application of before mentioned materials is reassured.

Yet, it is not the traditional materials that are solely responsible for poor quality of architectural production. In conditions where the number of real-estate buyers exceeds the number of the real estate offers, the demand for quality, even in the sense of comfort, is second grade feature. The regulation of the building quality is left to personal interpretation and fulfilment of downgraded quality criteria of Construction legislation. The economical investments of developers are guided by short-term retrofit period and rare are the cases where long-term strategy is developed. That brought us to situation in which there are no players interested for investing in development of construction sector. While “contemporary (European) architect has access to a greater number of building products—devices, assemblies, and many components—than at any other time in the history of the built environment”(Fernandez, 2004: p.54), the Serbian architect employs his creativity on completely different level and explores the models to simulate his design by rather primitive means.

3. PROBLEMS AND CHALLENGES IN SERBIAN CONTEXT-HOW MODERN ARE WE?

Exploration of the built context revealed several modalities of construction application regarding, what we called, "level of modernity". We labeled them as light modernized, mutant and quasi-modern construction process. Certainly, the list of modalities is not exhausted, but these three represent the most striking phenomena in nowadays building practice.

The **light-modernized construction process** addresses traditional construction process with some improvements brought up through process of modernization. It is very close to those of pre-industrialization and relies on traditional construction techniques, which are just lightly modernized to meet nowadays criteria. This does not necessary mean that construction solutions are inadequate per se, but the application of the solution is often misguided by interest for building cheaper. The process of construction is labor oriented, slow and with arbitrary controlled quality. The appearance of the building shows both elements of tradition and modernity, usually in unarticulated juxtaposition.

The next level of modernization lead to **mutation of traditional models** to meet needs of nowadays building production. The mutation of the elements and processes appeared in the need for acquiring desirable level of modernity in appearance, triggered by architectural design. Also, the gap in development of construction sector left the market with underdeveloped construction techniques for new investors and building types. The ad-hoc modification of the existing ones did not require any investment in construction sector development, and thus show the desirable level of feasibility. The modest offer of construction materials on the market supported this tendency, as well as fact that rather simple techniques in use did not seek for trained builders. Faced with such conditions, the builders started compiling available elements and applying known technologies, in unprecedented combinations and building types, reaching the very limits of structural stability.

In some cases, the modification came as a substitute for underdeveloped construction solution when there is a strong tendency towards certain architectural appearance. The most striking example of this is roof construction, which is built in traditional timber framework, since there is no valid construction solution for production of roof terrace. However, architectural design and visual appearance does not regard bulky steeped roofs for a desirable expression tool, and this dissonance between visual and structural results in roofs hidden behind attics (causing problems with gutters).

Quasi-modern construction process is a result of more delicate process of modernization, where certain aspects of building technology give "the appearance of modernity". In the final stage, the "the product" appears to be modern, and simulates the application of high-technology. This is most obvious in building types that have iconic pretension, like hotels and banks, which show very inconsistent attitude towards application of technology. In most of the cases, application of high-tech solution is fragmented, and the last generation air-

conditioning system could be easily installed in brick parapet.

The simulation of high-tech comes usually in two options: one is the envelope of the building, and the second is building service systems. Thus, reflective curtain-wall is regarded for construction element which underlines "modern intensions" of design, regardless the fact that this type of glazing is overcame in contemporary practice. Several explanations could be seen for this phenomenon. One certainly lies in speculative nature of investment, where the question of profit shades all other issues, and specially those costly ones, as high-tech facades of new architecture are. The other might lie in uncertain social acceptance and communication obstacles that new kind of architecture could have with wider community. The loss of understanding for contemporary architecture in Serbian society could be explained by long period of isolation and strong shift in social values. This way, even the branding through building has to be associated with common and widely recognized architectural language that includes elements such as reflective glass curtain-wall. The new rapprochement could be initiated by strong academic initiative and persistent "architectural campaign".

4. MOVING FORWARD- THE ROLE OF EDUCATION AND UNIVERSITY

"Technology profoundly affects the cultural, political and psychological conditions of a society and is in turn shaped by socio-economical forces unleashed by it." (Steele, 2005: p.20). Technology evolves with society's prosperity and openness, but when specific society gets isolated for any reasons, all factors of prosper stop. What attitude should education assume in that case?

Although Serbian and European architectural education are both affected by discursive development of education and practice, the perspectives are still completely different. While European architectural education faces problems of catching up with the unstoppable practice, Serbian architectural education promotes the fresh and new way of thinking and understanding architecture, opposite to one seen in the built environment. The certain level of abstraction of given context and relying on desirable prediction in the education process of architects is justified by the need to push education forward. "The desire for engaging the potential of new technologies requires an understanding of their potential to serve architectural interests".(Fernandez, 2004: p.64) This way, the future shifts in practice could be generated by new profile of practitioners to come.

Another burden of Serbian construction sector development is its elusive sustainability, in both economical and ecological sense. The common feature of all the modalities presented is that they not even have an essence of sustainable process. Even if some elements appear to be sustainable, the context for their installation and overall building performance make their application unreasonable.

The future of sustainable practice relies much more on the wider social acceptance but on the individual

awareness. Important social role of University and high level of sustainable awareness that is expected for academic community could be exploited to generate changes in sustainable consciousnesses within wider community. While waiting for the society to recognize and adopt coherent environmental strategy, the progress must be made in the education of those highly involved in the process of change.

“Sustainability and architecture are synonymous terms. While sustainability, physically and economically, is to a large extent manifest in the habitat built form, it is the scientific temper that will lend a design methodology and process, in order to render architecture sustainable” (Krishand, 2002: p.405). “Thus, the teaching of sustainability is to large extent the teaching of architecture. If we can even consider unsustainable practice, that can only be justified in the realms of design studio. Future refinements will distinct only “shades of green” within the strong ecological paradigm” (Konstantinovic, 2007: p26).

Design of the environmental courses network is based on projection of future practice requirements, where the strong sustainable initiative will seek for educated experts. The development of courses and educational and practical outcome will refine the strategy and set new standards. “The sustainability agenda embraces the inter-relationship between social and economic wellbeing and environmental degradation; however, the significance of these issues is as yet poorly reflected in construction’s current focus on targeting efficiencies in terms of cost, quality and time.” (Murray, 2007: p.20) In our case, any reflections to the construction sector would be beneficial, since even in the academic realms these issues are considered quite arbitrary. The level of ”sustainable education” is left to individual consideration proving that commitment to the problem without wider consideration is not sustainable at all.

5. EMBRACING THE CHALLENGE

“Space is evolving through design and even through the production/construction phase” (Papalexopoulos, 2007: p.29) thus anticipating integral approach with redefined positions of the diverse players. The compatibility of the output profiles is the essential for desirable changes in the practice that changes in the education are targeting. The compatibility of practitioners should be established in the educational phase in order to avoid obvious gap that exists nowadays. The remote and underdeveloped relations between Institutes and departments are not beneficial for overcoming the situation. If contemporary practice is multidisciplinary process, how can key players be so much detached from each other?

While waiting for academic society to evolve we face the challenge of changes in our immediate environment. If the realms of built environment are showing traditional construction process, how far should we push the education on construction technology? What are desirable criteria to be met, European or Serbian? With described changes and reforms still to come, we shall produce architectural engineers as competitive profile for the European market, but what happens with

these “super-educated” engineers in the realms of our domestic market? Would they be able to respond to strict needs of investors and market that do not understand nor consider new technologies and constructions?

What is expected of future changes in educational platform is establishment and development of close and lasting collaboration between research, practice and education. Through this, training will strengthen students’ ability to comprehend and apply facts and skills taught as early as in the education phase. This “integrated educational and research infrastructure” will also help overcoming widely recognized and criticized detachment of architectural education from practical realms. Their personal and academic development, with clear comprehension of technological background, will “infuse structure of thought developed as a tool to respond to blinding change in building materials and the technologies.”(Malecha, 2007: p.24).

“There are many ways of framing architects’ common concern for technology, among them are the phenomenology of material; the sequence of building; the theory of structures; the culture of construction, production, and consumption; the organization of practice; and the life cycle of a design. Some of these stretch our understanding of technology as phenomena . . . as culture as organization. (Cavanagh, 2004, p.3)” The anticipation of desirable reconstruction of social values might in deed interrelate with economical and environmental components of sustainable development, and be addressed “at the same time” to make a progress. In these new realms, the issues of architectural aesthetics, building quality and comfort would be promoted to the point where relations between values taught in the class and values found in the reality are clear to comprehend.

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Figure 1. An overview of contemporary European practice shows strong motivation for development of new materials and construction techniques, initiated by progressive architectural design. However, the interest of the investors is crucial in such cases, since the high-tech solutions require strong financial background.



Figure 2. The front view of the building simulates the application of the roof terrace. However, the side view reveals the steeped roof construction.



Figure 3. Modernization of envelope that underlines the design's attitude towards modernity. The 4 stars city hotel offers all conveniences of comfort, modern appearance wrapped around rather traditional structural solution

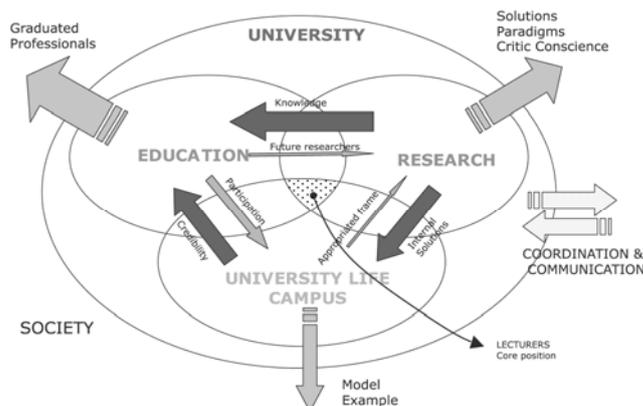


Figure 4. The University's role in society regarding sustainability: the complex and interwoven relations clearly demonstrate the strong interdependence of the key players (Ferrer-Balas, 2004: p.241)