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EDUCATION OF ARCHITECTURAL ENGINEERS IN SERBIA FOR THE SUSTAINABLE DEVELOPMENT MODEL

Abstract

Understanding the developmental needs of society, engineers have always enabled the development of civilization. Due to the challenges they faced and the tasks that await engineers in the future, there is a need for their new knowledge and skills, necessary to solve problems related to the paradigm of sustainable development. This paper analyzes the requirements of the sustainable development model and the role of architectural engineers in creating solutions within this model. The basic potential for sustainable development consists of educated and professional people in general, education and training of architectural engineers for efficient performance, in modern conditions imposed by globalization with strong competition in the open world market and knowledge society.

Keywords: education, sustainable development, globalization, architectural engineers.

ОБРАЗОВАЊЕ ИНЖЕЊЕРА АРХИТЕКТУРЕ У СРБИЈИ ЗА МОДЕЛ ОДРЖВОГ РАЗВОЈА

Сажетак

Разумевајући развојне потребе друштва инжењери су одувек омогућавали развој цивилизације. Због изазова са којима су се суочавали и задатака који инжењере чекају у будућности, јавља се и потреба за њиховим новим знањима и вештинама, неопходним за решавање проблема везаних за парадигму одрживог развоја. У овом раду су анализирани захтеви модела одрживог развоја и улоге инжењера архитектуре у креирању решења у оквиру овог модела. Основни потенцијал за одрживи развој чине образовани и стручни људи уопште, посебно је анализирано школовање и усавршавање инжењера архитектуре за ефикасно обављање улоге, у савременим условима које намеће глобализација уз јаку конкуренцију на отвореном светском тржишту и друштву знања.

Кључне ријечи: образовање, одрживи развој, глобализација, инжењери архитектуре.

1. INTRODUCTION

Modern technological development has conditioned the need to change the traditional use of certain natural resources, including material resources (mineral, physical, biotic) and natural conditions (water, climate, atmosphere). An accelerated transition is now underway from the classic socio-economic model, based on the maximum exploitation of natural resources according to the norms of outdated industrial development, to a new technological, economic and social model of sustainable development, dominated by knowledge and all new technologies.

The concept of sustainable development includes technological, economic, cultural, sociological and environmental components, but is based on technical disciplines - specifically engineering. Since engineering is the main actor and support of modern development, it has obligations to develop and introduce appropriate technologies in a creative relationship with other elements of the social system. Business methodology within the concept of sustainable development implies detailed knowledge of each technological change as a development process, and especially the dynamics of diffusion of new technologies, as well as the consequences of this process on economic activity and social development.

Since the beginning of the development of human civilization, engineers have shaped the world in which man lives [1]. Since the time of Aristotle, cognition and study of complex phenomena has been done analytically, by breaking down the whole into components, and their synthesis in the field of technical and technological development primarily belongs to the engineer as a designer, researcher or user of technology.

Of course, technical and technological development includes other disciplines, which obliges the engineer to know other areas, so much so that he could design and implement a correct and rational approach in that synthesis. In this sense, the aim of the paper is to identify the current and future role of architectural engineers in the implementation of the concept of sustainable development, taking into account the global character and specifics of that development. Due to the connection of technological development with global economic and social trends, attention is paid to new trends in education, from the point of view of current and future structure of the world economy and use of resources for development, from the point of view of education and professional training of architectural engineers, but so that it is in the function of improving the quality of life of present and future generations. In the text focuses of the Faculty of Architecture in Belgrade explain the AF BG has been such as because it is the oldest, biggest and the most significant and influential school in the country, and the base for all other national schools

2. TECHNICAL-TECHNOLOGICAL DEVELOPMENT AND THE PROCESS OF GLOBALIZATION

2.1. MODERN MODEL OF ECONOMIC AND TECHNOLOGICAL DEVELOPMENT

Until a few decades ago, natural resources in the economic sense were considered key elements of economic development, and most countries pursued their own development policy with the maximum use of all natural potentials. This policy did not stand the test of time, and the emergence of the development crisis during the 1970s meant the beginning of the process of redefining the model of economic development and changing the overall structure and dynamics of relations within the global system [2]. Today, changes in development policy are underway with the implementation of globalization and the creation of an open market, with accompanying crises, disruptions and economic recessions, which can be seen as a result of great mismatch between the dynamics of technological development and social environment. The mismatch between the mutual influences of man and nature led to the exhaustion of the development potentials of the old model, in which thick smoke from factories and large parts of occupied and endangered areas became a measure of economic power and success of industrial society. It is a well-known fact that such growth of the world economy has had negative consequences in terms of environmental degradation and degradation, as about 24 million hectares of fertile land (Australia-sized area) and about 17 million hectares of forest (Austria-sized area) have disappeared each year. cutting and turning into arable land, and due to drying caused by air pollution and acid rain.

Today, it is clear to everyone that such a development policy, based on excessive exploitation of natural resources and environmental pollution, does not satisfy the equal basic rights and living needs of present and future generations. Such a model of economic and social development did not adequately treat the need to maintain the balance of relations between man and nature, nor were the effects of such development adequately determined, because the costs of depletion of non-renewable

resources and degradation of the natural environment were deliberately neglected. successful accumulation of capital and growth of national income. Because, production in which resources, space and environment are treated as non-economic development factors, ie as a public good available to everyone and without paid price, has as a final result a drastic reduction of natural wealth.

The adoption of the concept of sustainable development was made at a time of great and sudden changes in the world in the form of crises and a number of existential problems of modern civilization (political, social, economic, environmental). The new concept is focused on integrated economic, technological, social and cultural development, harmonized with needs

conservation of resources and protection of the environment. But, instead of solving the problem of dirty technologies in developed countries, their transfer and continued production in underdeveloped countries (which does not achieve positive change at the global level), the new techno-economic policy included the formation of markets with specific requirements and development of new technologies. which in their functional structure respect the principles of sustainable development.

The transition to a new model of development cannot be done without problems in the transformation of existing production potentials, because it implies a change in the prevailing patterns of social behavior and outdated institutional infrastructure, which in the new situation are no longer sufficiently efficient.

As the concept of sustainable development implies that man uses nature to meet the needs of present generations without compromising the ability of future generations to meet the needs of their own natural resources, sustainable use of natural resources only as far as their reproduction allows, implies harmonization of economic development environments, ie the limited use of non-renewable natural resources and the growing orientation towards the use of renewable resources. The concept of sustainable development has been declared the basis of world development policy by the UN, and the Program of Activities for the 21st Century ("Agenda 21"), a UN document adopted in Rio in 1992, is based on it [4]. The concept of sustainable development introduces the principle of internalization of external costs, which implies that activities that have been developed (and successfully operated) in the former economic, social and civilizational environment, can cause greater damage to the natural environment than economic benefits. This concept also calls into question the application of the previously introduced principle that "the polluter pays", ie. to bear the external costs of environmental damage, as this also leads to a deterioration in their economic performance.

Radical advocates of environmental protection believe that within the new techno-economic model, all economic branches that inadequately treat the relationship between man and nature should be abandoned, and even the models of export economy that result in the depletion of natural resources should be abandoned.

In many countries, science and technology have long been used as a means of rapid social growth, because investors as carriers of this development were motivated to improve the performance of technologies, products and services, and technological innovation. Today, in accordance with the understanding that the positive impact of new technologies on changing the factors of the productive process is comprehensive, and thus affect the increase in quality in some parts of the reproductive process, the absolute advantage belongs to new technologies.

2.2. CHALLENGES OF GLOBALIZATION

The change in socio-economic development was introduced by the process of globalization, which is reflected in the creation of a unique economic, political and cultural environment, in which people, ideas, goods and capital circulate freely, so that the world becomes mutually integrated. Everything that is happening at the local level can be reflected globally, which has enabled the advancement of technology, at the heart of which are new information and communication technologies, and the transfer of technology and knowledge has become a key element in achieving international competitive advantage.

Globalization as a process has been going on for centuries - since the appearance of the first caravans and overseas sailing ships, and it has accelerated the construction of railways and highways, the use of container ships and the emergence of air traffic, to its full expansion. Therefore, it is believed that globalization has emerged as a result of great technological progress, and its center is the rapid flow of information and information and communication technologies.

As the process of globalization introduces as a necessity the opening of national markets to global competition, every company (as well as the national economy as a whole) must ensure global competitiveness in order to survive and thrive. Globalization is also changing the way companies

do business. For example, today all 132,500 components for the new Boeing 787 are produced in 545 locations around the world [5].

In the business world, human resources and their knowledge are becoming the main value of companies and are recognized as a real source of competitive advantage [6]. The emergence of an open world market is accompanied by the need for a more skilled workforce, the acquisition of new knowledge becomes imperative, because the competitiveness of a company increasingly depends on the structure and qualification of the workforce and its ability to accept new knowledge and technologies [7]. Modern companies are constantly exposed to pressures to increase labor productivity, which directly depends on the quality and educational level of the workforce, and are directed to a market where there is a growing demand for educated professionals [8].

Thanks to globalization and the development of technology, knowledge and innovation are becoming the key to global competition, and the mobility of professionals has increased due to the growing need for a more skilled workforce. Competition and deregulation also lead to the necessary restructuring of companies, and even entire industries, with inevitable changes in the shaping of the work process and the workplace itself. Today, the working environment is changing at a tremendous rate, so that the former division of workers according to white and blue collars is being lost. The application of computers and technological improvements has changed the very nature of work, as well as specific requirements and other conditions for its performance. With the development of information and communication technology, the globalization of business is increasingly putting the intellectual capital of the company [9].

Accelerated changes in the environment and convergence of knowledge in many areas will make the profile of engineers move out of strictly technical templates. In order for engineers to take the lead in creating responses to global and local, technological, economic, social and other challenges of globalization, it is necessary to understand and respect nature, ethics, economy, society and culture, to be able to quickly identify in a changing environment needs to create and implement long-term sustainable and efficient technological solutions [10].

3. ECONOMY, SCOPE AND OBSOLETE OF KNOWLEDGE

Due to the increasingly competitive environment created by globalization, as a result of the imbalance between supply and demand for staff in key areas, there is a lack of appropriate experts. While on the demand side are the challenges posed by global economic growth, as well as the rapid growth of the technology and telecommunications sectors, on the supply side are mostly older generations of professionals, whose exit from the technological process is not balanced by younger professionals entering the same market [11]. While on the one hand the demand for staff has increased, on the other hand the lack of appropriate experts is intensifying the struggle for staff [12].

Globalization is unstoppable, in the future an even fiercer struggle for staff is expected, in which companies must constantly look for new and creative approaches to the development, motivation and retention of their staff. In response to this personnel crisis, Western economies are trying to attract experts through the so-called "Brain exchange" or "brain circulation". Such movement of experts is two-way, but usually not permanent. The governments of many countries are therefore trying to help their companies find staff by investing large amounts of money and time in programs to attract and retain domestic staff, but also to intensively attract experts from foreign countries. Thus, for example, the United States uses the so-called "Green card".

The knowledge economy is mainly based on specialized knowledge and the skill of connecting, identifying and solving problems. As a rule, new areas of development and investment cause disruptions of the institutional environment and cross-confrontations, which slows down the diffusion of new technologies. On the other hand, new technologies enable the greatest productivity growth in those industries or activities that are most easily transformed and adapted, and which were less attractive for earlier mass production technologies used by engineers in the previous development model.

At the same time, the volume of newly created knowledge in the world is increasing at a tremendous rate. Experts expect that in the next ten years, as much knowledge will be "produced" as in the previous 2000 years. This will necessarily lead to the most intensive technology transfer and dissemination of knowledge in history, as well as to the establishment of new global

measures of value, as the boundaries of all kinds will gradually disappear.

As a result of this process, although more and more widely available, knowledge will become obsolete faster. Research has shown that the level of obsolescence of knowledge has accelerated 10 times in the last 100 years [6]. This means that if at the beginning of the twentieth century it took 40

years for the level of knowledge to fall by 50%, at the end of the first decade of the 21st century it happens in just 4 years.

4. EDUCATION AND PROFESSIONAL TRAINING OF ARCHITECTURAL ENGINEERS

4.1. ENGINEER TRAINING

The rapid development of new technologies, as well as their competitive struggle on the world market, have led to great competition from the leading countries in the field of technological development, ie science and school education. The education of engineers gained a major role in the development of new technologies and the development of modern means of production, as well as in the formation of methods of managing technological processes, which depends on the quality and cost of production and competitiveness of the economy in the world market [13]. As there are frequent situations in such a market that companies have to change production, even the type of activity, an engineer must be able to adapt to new conditions, and his education becomes the integration of technical education with natural science, humanitarian and socio-economic education.

Based on the observed trends, it is clear that engineers expect a number of challenges, such as: forming the physical infrastructure of fast-growing urban areas, optimizing clean energy sources, providing drinking water, expanding information and communication infrastructure, adapting technologies to aging populations, environment, management of complex projects and interdisciplinary problems, all with increasing customer demand in terms of quality, design, flexibility and personalization of products. At the same time, attention must be paid to correcting and neutralizing the consequences of the hitherto inadequately implemented model of world socio-economic development [14]. Such a set of tasks awaits the future engineer.

The traditional study of technology consisted of introducing students to fundamental knowledge that would enable them for real life. It was important for the faculties that the students get a solid base, and the historical faculties were not particularly interested in what they would do in the future. Such schooling was placed somewhere between preparing graduates for further academic careers or for work in the economy, where they will learn how engineering work is really done. Practically, graduates are ready to pursue careers in one of four general directions:

- academic (researchers; research and teaching associates; future university professors),
- professional (engineers, project managers, company managers),
- commercial (sales support, product management, marketing, sales) and
- entrepreneurial (running your own business or participating in a team that includes both business and technical part of the company's business).

Higher education is now at a serious turning point. Education will need to offer a new set of knowledge, skills and competencies that will enable engineers to cope with a rapidly changing environment and to help society adapt to change. Namely, the speed of technological development has greatly exceeded the objective needs of society and, in order for society to get the most out of existing technology, it must learn how to adapt that technology to its needs while remaining in harmony with nature. It is understood that the education of engineers should be shaped by the requirements of the global market and the rules of global business conduct, where the concept of knowledge-based economy is increasingly prevalent.

The countries of the Western Balkans, including Serbia, are mainly looking for ways and mechanisms to transform their economies, speed up integration into sustainable development and expand access to clean and safe technologies. Without questioning the quality of education that engineers receive in the Western Balkans (this quality has so far been verified by their easy and fast employment in foreign companies and their success in the world), they most often

fall into the category of better paid technical staff. As such, they perform the technical tasks entrusted to them in the economy or in development, doing the creative part of the job, defining the characteristics of products, selling them, analyzing the market and competition, and according to their success, they are more rewarded.

As the concept of sustainable development is most often aimed at the rational use of natural resources while preserving natural ecosystems and raising the quality of the environment, it can be considered that this concept is a special challenge for engineers, who in these activities

contribute to long-term sustainable development. In order for the countries of the Western Balkans to be ready to offer something new to the global market, they must change the education system so that future engineers can be more competitive in the domestic and world labor market and able to respond to paradigm shifts. Graduates of engineering must be ready to manage a team (when, due

to good engineering knowledge and achieved results, they are entrusted to be project managers), to know very well what the market requires and how to turn their business idea into a business plan, which will and be financially sustainable. At the same time, they should know the behavior of the customer and his future needs, which contributes to the harmonization of their creative innovative ideas and with reality, measured by business success.

The time of globalization poses a huge challenge for technical faculties to improve the situation in which curricula are very unevenly harmonized with the Bologna Declaration, new faculties are opened, competition between private and state, domestic and foreign faculties is stronger, global trends in science and education are changing rapidly, industry and employment, and the economy is becoming more knowledge-based. The enumerated trends and observed potential problems that engineers will face indicate the need for new skills and abilities that need to be developed in them [15]. This means that the education of engineers will continue to be firmly based on technical sciences, physics and mathematics, but also that it must be expanded by connecting with the social sciences, economics, art, design and other fields. At the operational level, priorities in the education of engineers are preparation for practical work on real-life examples and through a complete cycle model, from problem identification to monitoring the function of the implemented solution. Therefore, it is of special importance that professors also have experience from practice, ie. that they worked for or in the economy and solved practical problems.

In connection with the acceleration of the process of creating and obsolete knowledge, he also raises the question of the need to introduce new diplomas in order to be clearly recognized, formally verified and more precisely determined level of qualification necessary for the knowledge-based economy.

For example, from the beginning of the 20th century until today, the number of doctors of science and the age in which a doctorate is obtained as the highest formal qualification have changed drastically. At the beginning of the last century, when graduate engineers were rare, the doctorate was acquired exceptionally. In the middle of the 20th century, the doctorate was perceived as the crown of a career and was acquired in advanced working life (with 45 years of life in Europe, 35 in the USA), while today it has become normal for students to obtain a doctorate in engineering without previous work. experiences (with 27-30 years of age) [5]. This change imposes the need to recognize new degrees of qualification of engineers, with the introduction of lifelong learning.

4.2. PROFESSIONAL TRAINING AND DEVELOPMENT OF ENGINEER'S CREATIVITY

In today's knowledge-based economy, the contribution of knowledge-based professionals is of strategic importance. Therefore, the acquisition of new knowledge and skills through professional development of employees, which leads to new products and increased productivity, has become necessary to achieve competitive advantage, and plays an important role in market positioning and human resource development. It is evident that the multidimensionality of the modern world, and thus the problems that an engineer encounters, requires him to constantly acquire new knowledge and skills. This means that he must constantly supplement his knowledge and abilities, which practically means that he must be committed to continuous professional development through the so-called. lifelong learning.

So far, it has been characterized by frequent misuse of engineers' knowledge in order to make as much profit as possible in the shortest possible time, with the usual ignoring of the consequences of such behavior. The global application of this model has already led to instability and crises around the world, and in the ethical sense it is necessary to make evolutionary corrections of engineers' actions in order to bring their activities to balance the needs of technological development and ethics [15]. This would help overcome turbulence in the process of globalization and in the transition to a new era of post-globalization. Essentially, this implies an additional challenge for the continuous ethical training of engineers.

A common factor for all countries is to focus on the market and to constantly find new products and services that will respond to still unmet or future market needs. At the same time, competitive advantage in the globalized market is achieved not only thanks to scientists and educated engineers, but the greatest profit growth is achieved through creativity and innovation, and the area that shows the greatest growth is the application of creative solutions and innovations in old technologies [16]. In the field of high-tech economy, a particularly great turn towards creativity is being implemented, where creativity is becoming a key competence of engineers in the future knowledge society. Such an economy reduces jobs in the manufacturing sector by shifting low-paid activities to underdeveloped countries, where wages are low and work ethic is high (as is the case in Japan, India, China). Strategic changes are made by constantly improving business, reorganizing, changing

activities or closing unprofitable companies, which has become a special challenge for managers, but also for engineers, who, in addition to professional knowledge and skills, require the ability to creatively use non-traditional methods in solving problems.

Historically, human creativity has enabled the development of society, the acquisition of new knowledge, the creation of cultures and other foundations important for the general progress of civilization. However, innate creativity has a relatively low probability of appearing, so it is necessary to develop it. Creativity requires a lot of knowledge, preferably from several different fields, because in order for knowledge to be connected into new wholes, it must be enough about each area in which a person wants to be creative. Artificial intelligence has been significantly improved (supercomputers are already beating people in chess and other games dominated by combinatorics and analytics), but its ability to creatively solve problems is still very far away. Therefore, with the knowledge and experience, the creativity of experts will remain highly valued.

Today, the labor market is globalized, and the globalization of the world economy is intensifying the search for creative talented engineers. As technology opens up new frontiers of information and access to new knowledge, it also creates the opportunity to hire an increasingly educated and skilled workforce from the market. Because of a better job, talented engineers easily change countries and companies, so migrants are often more qualified than domestic staff. However, migrants can improve the quality of products in the short term, but not in the long run, because in the meantime, domestic staff will learn new techniques and practices that foreign labor has brought from their country. Due to the growing internationalization of information, ideas, goods and capital, as well as the talent crisis, the demand for talent is expected to intensify in the next twenty years, because the departure of talented professionals usually harms the company, it must adapt to the situation for creative talents.

Contrary to the growing need for creative staff, business circles are faced with less and less opportunities to find experts who will effectively lead companies and successfully confront business and technological challenges. The system of student education at the faculties, as a rule, forms a reproductive engineer,

trained mainly for routine work, so that the creative character of design and research and development work requires additional professional training in order to acquire skills and abilities to be able to see certain problems from another perspective. This is especially because he is an engineer as a rule and in the role of coordinator of development ventures, and must not only know his (technical) profession well, but also know enough other professions covered by a specific multidisciplinary project to be able to perform a creative synthesis of results of all professions and give an integral assessment application of certain technological solutions.

It is here that significant disruptions arise from the system of general education, where creativity is almost neglected [17]. This leads to the need to reform general and special vocational education so that the complete education system becomes dynamic and constantly improves, creating, in addition to training students to perform certain tasks creatively, the possibility of their further continuous training [18]. This is a new challenge for the higher education system, which needs to constantly adapt to the growing demands of the world market for educated and creative engineers while creating opportunities for their continuing professional development while working, as well as acquiring new qualifications within the higher education system. new and loss, ie reduction of the possibility of using the remaining previously acquired knowledge.

5. HISTORICAL OVERVIEW OF ARCHITECT'S EDUCATION IN SERBIA (19TH-21ST CENTURY)

Research on the overall development of the educational process of architectural engineers in Serbia shows that throughout history, it has been constantly changing and reforming.

The beginning of the education of architectural engineers in Serbia took place first at the Lyceum, which was moved from Kragujevac to Belgrade in 1841, when the first reform was carried out. Then the teaching of Civic Architecture was introduced. The official beginning of architectural education in Serbia is considered to be 1846, when the first Engineering School was established in Belgrade, outside the Lyceum, which lasted for three years.

If we look at the development of teaching at the Department of Architecture of the Technical Faculty, from the founding of the University to the First World War, we can see that developed and deepened various disciplines of architecture, from designing different types of public and private buildings, through knowledge of European architecture and historical styles. own medieval heritage, to the knowledge of construction technology, modern building materials and structures. Thanks to well-educated teachers, in European schools, and in practice, during the design and construction of

important public and private buildings, there was a permanent rise in teaching levels, so that the level of education of young professionals has largely reached European standards. In order to better monitor the development of the profession, technical and technical and stylistic changes in European architecture, the Department of Architecture has constantly developed and supplemented curricula, so that graduates were much more willing to work in practice, which is why their additional education was no longer necessary. in foreign schools [19]. After the First World War, there were some changes, which were more reflected in the individual authorial contributions of individual teachers and assistants than in the general curriculum. Between the two world wars, there is a strong influence of Russian emigrant architects, who mostly used belated classical academic design when designing monumental public buildings, while smaller buildings were characterized by so-called civic architecture. On the other hand, modern curricula, plans and architectural design influenced the formation of mostly domestic architects gathered around the Group of Modern Architects (GAMP) and their supporters. Before the Second World War, the earlier practice of graduate architectural engineers from the Department of Architecture going abroad to study or to supplement their studies with a shorter or longer stay in schools abroad was discontinued. It was a great success of the Belgrade Department of Architecture, which managed to raise teaching to the European level.

After the Second World War, the more pronounced artistic character of education is noticeable, based on the architectural authority of individual professors through so-called classes and studios. This was, among other things, achieved by the freedom left to professors in the formation of methodological units within the subject, which lasts to this day. The general impression is that the Faculty of Architecture applied several educational methods ranging from polytechnics to the application of Bauhaus elements. The intensive period of changes in curricula began after the Second World War, when subjects with contents were introduced, which were compiled according to the requirements of the new social and state system with an emphasized social note.

Of all the reforms throughout history, certainly the most significant and influential was the one called the New School, adopted in 1971 under the leadership of Professor Bogdan Bogdanovic [20]. It is the only example of implemented experimental and radical reform in the education of architects in Yugoslavia after the Second World War. The new school implied a comprehensive change of the curriculum as well as a methodological approach in the implementation of teaching. New pedagogical models have been applied in it, radically changed in relation to the previous architectural school system. This reform process at the Faculty of Architecture in Belgrade was part of a broader movement at the world's most eminent architectural schools, as evidenced by the connection between the New School curriculum and teaching methods, and the most famous architectural faculties in the world. The teaching methods at the New School were a combination of approaches present in Columbia, Berkeley and the School of Architecture (AA) School of Architecture in London.

Since 1976, the reform processes at the Faculty of Architecture have continued to take place in a much more conservative way. The implementation of the Bologna reform at the very beginning seemed to be a renewal of the turbulent period of the introduction of the New School, but very quickly the whole team accepted the proposed reform because it was related to

international TEMPUS (Trans / European Mobility Program for University Studies) project and national decision to join European integration.

The basic principles of the New School have remained relevant to this day and can be clearly seen to the greatest extent, although sometimes expressed in different terminology, in the Bologna reform curriculum. Numerous attitudes, defined in the New School program, such as multidisciplinary consideration of the design problem, research, discussions, scoring, etc., are present today in the curriculum formed in 2005 by the acceptance of the Bologna Process. Therefore, the New School in certain segments can be considered a precursor to the Bologna Process. The reason for this is that the basic principles of the New School were, in fact, taken from the international experience that this form of learning architecture cyclically reactivated, always in periods of turbulent socio-political events.

The teaching method is a studio in which teachers direct students to the sources of necessary knowledge, which leads them to theoretical courses that emphasize the importance of connection with projects. With these methods, students are trained to independently reach adequate sources and solve creative problems. The studio is designed so that in addition to the subject professor, professors or associates from practice from various disciplines related to the topic are included in the issue.

An interdisciplinary approach to the design problem is a common feature of the New School and the Faculty of Architecture reformed after the Bologna School. Interdisciplinarity in the New School envisages the elaboration of a project from various aspects of the living environment and the use of

engineering methods in which all architectural disciplines participate (design, urbanism, constructions, graphic presentation).

In the New School, teamwork and directing students to different disciplines are emphasized. In the Bologna reform, teaching in the form of design studies focused on students' independent work, unlike the New School, where design topics were covered in boxes, in permanent student jobs, where teamwork was imperative. Topics that are then were current in the New School are equivalent to today's modules in Architectural Faculty in Belgrade. They have different content, but the basic principles are the same. The student scoring system instead of grading was also a novelty in the 2006 program, and the same evaluation method was present during the New School, almost thirty-five years earlier. Orientation of students on topics that they would deal with in practice is present in both systems. Today, as in the period of the creation of the New School, the Faculty of Architecture is respected and integrated with school systems that function in the European Union and in the world.

6. RETHINKING ARCHITECTURAL EDUCATION AND THINKING ABOUT ITS FURTHER DEVELOPMENT AND PERSPECTIVES

In the European area, there are several different directions in the context of the proposed direction in which the architectural school should move. Most architectural schools follow the recommendations of the European Directive in which architecture, together with medicine, is recognized as a regulated profession. Namely, the directive contains eleven points that describe the knowledge that an architect should have at the end of his studies. On the other hand, there are architectural schools that are "beyond everything" and are guided by local and global trends in the profession and conducting certain experiments that can be of great importance for monitoring changes in the development of the architectural profession.

In order to determine the direction in which architectural education should be developed, it is necessary to analyze modern school programs that have carried out reforms according to the instructions of the European Commission and possibly the recommendations of American institutions. In the analysis, the need for the regional character and uniqueness of each architectural school must be taken into account.

During the contemporary discussions on architectural education, the situation from the end of the 1960s is again relevant, which requires a more responsible approach to the environment from architecture. Today, the education of architects often follows models developed in the past. As a result, many schools are not ready to tackle the modern needs of the living environment. Some authors who deal with architectural education, realizing the irresponsible attitude towards the environment, once again look back at the importance of experimental schools from the late 1960s and early 1970s. The call for new reform in education accordingly implies the introduction of green themes in the curriculum [21].

Starting from the thesis that sustainable development should become the backbone of architectural education, it is proposed to introduce basic courses on ecology in the curriculum, in addition to basic already existing study subjects, which would lead to a deeper study of ecology and settlement history and further to provide the necessary minimum content for understanding all forms of environmental design.

Future architects, urban planners, planners and landscape architects should jointly attend a basic design course with elements of sustainable development. Without overlapping the three disciplines of environmental design - architecture, urbanism and landscape architecture, one cannot speak of sustainable architecture [22].

During the contemporary discussions on architectural education, the situation from the end of the 1960s is again relevant, which requires a more responsible approach to the environment from architecture. Students should find a connection between climate and different cultural adaptations, such as types of shelters or settlements, as well as define the consequences of climate change on the mentioned factors. The flow of materials, resources, energy, food and other goods of the globalized world, from extraction from nature to consumption, are also crucial. Although architects are increasingly using recycled materials, the use and flow of resources needs to be radically re-examined along with their impact on all forms of environmental design. There is also a need to introduce several more courses, starting with psychology and mechanics of perception, which would be an informative basis for aesthetic theory and reasoning, through an introduction to phenomenology, all the way to environmental psychology and the psychological urge to bring order to the environment. Architecture can shape completely humane physical settings by relying on knowledge ranging from psychology to ancient spiritual traditions.

The struggle with the methods of traditional study, which emphasizes individuality and underestimates the importance of socio-political factors, began in the 1960s, and was again actualized at the beginning of the 21st century. Namely, emphasizing the social and ethical approach to architecture, some theorists are beginning to interpret architecture as a sociological discipline. As a result of the design solutions of the "star" architects, objects were created that face pure artistic expression, which is based more on the beliefs of the individual than on the needs of man and social factors. The essence was to strike a balance between the artistic and social paradigm and to train architects who would be socially and ethically responsible. In the new millennium, there is little empirical understanding of the problems in architecture. The cramped private world of 19th century architecture, separated from science and practical life, is still largely present today in architectural education and practice [23]. Therefore, different architectural examples from practice should be equally represented in the teaching of architectural design. It is also important to set certain theoretical disciplines on a practical level and to overlap with architectural design. Such confrontation with great changes in the world leads us to the conclusion that no theory will be able to solve the modern needs of society in terms of architecture and urbanization.

The last year, many architectural schools have replaced independent design theses with faculty-led research studies. Many large architectural firms are engaged in research. Research at colleges today suggests a wide field, from traditional archival research to robotic experiments and specialized research on environmental impacts.

The main focus of many schools remains teaching, but cooperation on research projects will play an important role in the future. In the complex definition of architectural design, research has become increasingly important. Practical work in a research study or workshop is a form of empirical learning. The changes reflected in the emphasis on practice-based research have been particularly visible in the last two decades. With their activism, some schools of architecture, through research studios and workshops, are introducing the education of architects based on empirical learning.

In the last two decades, there have been changes towards practice-based research. Clients asked architects to be more involved in programs and project development decisions that require a broad understanding of social, economic, and cultural variability. Architectural buildings today would have to meet higher environmental standards as well as energy standards. Materials and technologies are evolving rapidly, and architectural experts must keep up with that development.

The general discussion about what architecture is leads to a number of different conclusions. From the social aspect, architecture is an integral part of human activities. Cities, settlements and buildings have always been the result of cultural, social and economic factors of the environment, which requires a complex responsibility from the architect. Numerous

academic discussions have brought to light a deeper interest in the changed role of the architect in society. The general view is that the architect must rise from the manipulation of three-dimensional space and get closer to society. This would certainly contribute to architecture and architectural education taking a higher rank in the socio-political life of the communities in which they live, which is certainly one of the basic goals they strive for.

7. CONCLUSION

The modern concept of sustainable development, based on the creation of a new economic structure, rational use of natural resources and increasing flow and more efficient use of knowledge and capital, implies major changes in education of all professions, which should meet the requirements of the integrated market. Due to their increasingly rapid change, an era is coming in which technologies will play a more dominant role than ever before, which means that the requirements for both quantity and quality of engineers will change. areas of work. Therefore, countries that are more able, thanks to the national education system, to quickly form appropriate profiles of engineers, will be able to adapt more quickly to new market demands.

As the modern economy is by nature a dynamic system that leads to the rapid obsolescence of technology and technologically colored education, human intellectual capital needed for fierce market competition cannot be created in a static education system, and the education system must be dynamic and spreading the fundamental education of engineers, creates conditions for their continuous professional development.

Although the improvement of the higher education system is a continuous process, its necessity is especially evident when new knowledge emerges or when new technical challenges arise before society, as expected in the time to come. In that sense, the ability to solve problems creatively is recognized as one of the most important skills that architectural engineers should have. The fact that creativity is not exclusively an innate trait of an individual and can be developed by learning,

practicing and creating a creative environment is an additional challenge for the education system, which should further improve teaching itself, using proven models that include challenging models and skills development. creative solving.

During the contemporary discussions on architectural education, the situation from the end of the 1960s is again relevant, which requires a more responsible approach to the environment from architecture. Students should find a connection between climate and different cultural adaptations, such as types of shelters or settlements, as well as define the consequences of climate change on the mentioned factors. The flow of materials, resources, energy, food and other goods of the globalized world, from extraction from nature to consumption, are also crucial.

Architects are increasingly using recycled materials, the use and flow of resources needs to be radically re-examined along with their impact on all forms of environmental design.

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