ROLE OF CONSTRUCTION IN THE EXECUTION OF THE EU RECOVERY AND SUSTAINABILITY PROGRAM

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Abstract. Construction has been operating over the past two years under the COVID-19 pandemic experiencing several difficulties in material supply, process management, and contacts. At the same time, digital transformation is also underway. The industry is one of the major employers in the EU, and it is critical for achieving sustainable goals and economic restart. Hence, for success in realization of cited goals, UNESCO notes that engineering "itself must transform to become more innovative, attached and responsible" applies. The Branch also must comply with the adopted Professional Code of Engineers of the World Federation of Engineering Organizations. The new requirements also suppose changes in the preparation of construction specialists complying with the European Charter of specialists. The present article analyses the current issues and the role of construction, organizations, government, and public administration in the EU program whose goal is Europe's transformation into a climate-neutral continent.

Keywords: COVID-19, construction branch, sustainable development, education.

1. INTRODUCTION

The past century was the century of great discoveries, while the computer and its role in the rapid adoption and development of information technologies is the undoubted leader. It launched Industry 4.0, the digital transformation, and artificial intelligence at the beginning of the 21st century. Their further development and application entirely changed the methods of communication,

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advertisement, and management of all human activities. Information technologies and digitalization are already present in our homes, business offices, television, and public transport management. Artificial intelligence more and more intensively occupies public life.

Parallel to Industry 4.0, the COVID-19 pandemic emerged and proceeded during the last two years. Its speed of becoming a global world challenge was enormous, and it partially changed public life and habits. It affected the economy, human contacts, healthcare, and the teaching process in schools and universities. Hence, Madam Ursula von der Leyen analyzed the state of the EU under the COVID-19 siege and noted that this is a global crisis teaching global lessons [1]. Since the EU member states dealt with the crisis in a disorganized manner, Madam von der Leyen called for the foundation of a European Health Union to guarantee that the new "EU Health Program" would withstand the pandemic. She also announced the establishment of the European Medicines Agency and the European Center for Disease Prevention and Control. Two major issues were outlined – the necessity of the entire rearrangement of life and management of the human activities under the pandemic, and the post-pandemic recovery and execution of the EU Green Deal. Klaus Schwab, the founder and Executive Chairman of Davos Forum, agreed with the statements and the planned measures. He pointed out the need to reform all aspects of public life and economy starting with "education, social contracts, and work conditions" [2]. Hence, "new investments in people and environment are needed" [3].

To attain those goals, digital transformation, circular economy, and sustainable development must be key instruments. EP and EC's first reaction was to adopt documents (Regulations and Directives) guaranteeing the successful development of the digital transformation in the member states: (1) Directive 2011/83/EU defining the character of digitalization and (2) Directive 2019/770/EU regulating the contracts of supply and digitalization. The EC assessed the digital connectivity, and online activity in different member states, and the conclusion was not quite optimistic – "the progress in some states is still unsatisfactory for Europe". A great difference is observed between different EU states. Leaders are Denmark, Sweden, Finland, and the Netherlands while Luxemburg, Ireland, Estonia, Belgium, Cypress, and Spain steadily approach them. Yet, Bulgaria lags according to the EC. Together with other states, it is to cover a long distance to achieve digital transformation and be competitive on the global stage meeting the criteria of the digital era. The EU Governing body finds business to be much more digitalized as compared to trade and construction whose digitalization is slow.

To treat COVID-19 issues and back up the economy of the member states, revision, amendment, and approval of new laws were launched concerning: circular economy, climate, energetics, the energy consumption of buildings, biodiversity, agriculture, innovations, etc. Climate and energetics laws' aim is to guarantee total climate neutrality of the EU and the adoption of climate-neutral energetics. Energy-related documents of the EU especially emphasize the intelligent sector integration of Hydroelectric Power Stations (HPS), electricity and heat generation, and natural gas decarbonization. The EU encourages the fabrication of sustainable (green) products for multiuse via the plan for a circular economy.

Other tasks have also been outlined to recover the economy [4]: actions against the pandemic; engagement of the European citizens in the agenda of the EU Framework Program for Scientific Research "Horizon Europe", 2021–2027. Members of the European Alliance for Pure Hydrogen were invited to present projects treating renewable low-carbon technologies and propose subsequent solutions backing up the strategy for hydrogen use and the guarantee of Europe's climate neutrality. A plan for Europe's recovery and sustainability was announced, while the European leaders agreed to add a recovery fund to the approved 2021–2024 EU budget guaranteeing the fulfillment of the "Next generation EU" program. The Bauhaus idea announced in 2020 was further developed. Madam von der Leyen attended the XXI online Conference "The New European Bauhaus", April 2021 stating that "New European Bauhaus aims to bring the EU Green Deal to life".

It is expected that the Green Deal and the plans for reforms and economic recovery will be an investment catalyst supporting the elimination of energy deficiency and the solution of EU demographic issues. They can also have a geopolitical effect [5]. Some speculated that the solution of the climate issues and the economic recovery not only in Europe but also worldwide will decrease the risk of migration of large mass of people thus attributing to the national security of the member states.

2. TASKS FACING CONSTRUCTION

Today the World fights the COVID-19 and construction operates under pandemic. It faces challenges of providing a healthy environment, safe work, and resistance to the pandemic spread. At the same time, society should solve issues of material supply, continuous management of various activities including the regular engagement of participants in work projects. Hence,

the branch should elaborate its operation under the pandemic to face the challenges.

Consider the entire living cycle of a building – extraction of raw materials, manufacture of construction products, construction, exploitation, management, and demolition. Data proves that construction accounts for [4]: half of the extracted materials, half of the energy supplied, one-third of the overall consumed water, one-third of the overall generated waste. A challenge to construction is its role in tackling sustainability issues by using environment-friendly technologies, which efficiently use natural resources, as well the guarantee of safety during the building entire living cycle. Note that the issue of using recycled materials remains open. It is not a new one but the branch did not use the planned volumes of recycled materials by 2020.

The congress of the Federation of Industry of the European Constructors (FIEC) was held on May 21. There, Madam Kadri Simson, EU Commissioner for energy, noted that the EU is on the brink of an enormous change affecting the buildings [7]. The so-called "sanitation wave" will aim at the modernization of 35 mln buildings in the EU, which is a new challenge to construction. If realized, the initiative will result in a significant amount of recovered buildings. Madam Simson added "The construction companies are namely the key to the success of this important initiative yielding economy of electric power and enabling one to fulfill the tasks of the Paris climate agreement", and we add here the Green Deal. Note also the FIEC statement stressing the material and technological neutrality to enhance the "green" and digital transition. Hence, we should enhance and popularize the planned "Deep Sanitation", while building energy renovation is expected to be one of the basic components of the recovery and sustainability plans.

The UNESCO report from March 4^{th}, noting World Engineer's Day [8], accounted for the essential tribute of the engineers (including the construction engineers) in the attainment of the Sustainable Development Goals (SDG). Note herein the engagement of the branch with the use of recycled materials, decrease of the CO_2 emissions, and environment preservation.

Similar was the address of Mr. Antonio Guterres, UN Secretary-General, to the Global Engineering Congress in 2019, who stressed "The main challenge to the UN is the realization of sustainable development requiring collaboration between different experts, resulting in a change of the socio-cultural system of the recent centuries" [9]. Note also the following obligations of the construction branch [10], i.e.:

- Providing clean water and hygiene standards. A requirement for clear water supply and wastewater treatment, including water repeated usage, rainwater collection and domestic and irrigation usage;
- The innovation and infrastructure development will significantly affect industry competitiveness and last but not least, will attract investments;
- Development of sustainable cities and communities by the implementation of new concepts to meet the urbanization challenges and construct sustainable buildings and logistics.

Construction is one of the most powerful and effective branches of the economy. Yet, it is one of the most conservative branches concerning innovations. Hence, construction is one of the branches with the least intensive digitalization followed only by agriculture. We witness nowadays a very fast digitalization and strong interest in Building Information Modelling (BIM). It provides continuous and actual information useful to making adequate decisions. Digitalization successfully proves its usefulness during the pandemic. To meet the pandemic challenge the Ministry of Regional Development and Public Works (MRDPW) appointed a respective workgroup in 2020, while European Digital Innovation Hub in the Construction Sector was set up at the Bulgarian Construction Chamber on May 27, 2021. It will be responsible for the introduction of digitalization in construction to increase the capacity, knowledge, and skills of small and medium construction companies and the public administration.

The Professional Codex "Principles for the adaptation to climate changes" approved by the World Federation of Engineering Organizations poses serious issues to our branch. The Codex is a specific guide to climate engineering analysis and effects on engineering practice. Its implementation will aid the branch organizations in finding solutions to issues of climate changes especially affecting the civil infrastructure and building construction. It formulates such tasks as assessment of the adequacy of acting standards, professional planning of exploitation life, risk assessment, and monitor of juridical responsibilities [11]. The following essential issues face the industry of construction material manufacture: decrease of CO_2 emissions, manufacture of sustainable (green) materials, a break with the usage of recycled and multi-use materials.

COVID-19 especially affected education, and it violated the normal teaching process and yielded additional expenses. Many educational institutions managed to use the emergency in accelerating digitalization. Successful technological solutions were found, enabling education to overcome pandemic challenges by minimizing physical attendance. However, some issues face educa-

tion. The concern teaching and training of students to successfully participate in the realization of EU programs:

- Universities were forced to introduce online teaching, and design or purchase programs to avoid crowding in lecture halls, i.e. need for additional funding emerged. Hence, education digitalization turned into a strategic task and priority.
- Digitalization, the designed innovative technologies, and teaching methods challenge education to leave its pure academic character and develop reality-oriented models. Moreover, education should integrate with science and manufacture. Nowadays the links "college–firm", "university–firm", "university–firm–research institute" are extremely important being a condition for product integration [12].
- A new attitude to online education emerges as a motor of new technologies. Note however that there are engineering disciplines where total online education is not preferable since the necessary acquiring of practical skills can otherwise be violated.
- It seems that "Cloud-based mobile education" can offer creative possibilities to both teachers and students since it introduces an active teaching atmosphere anywhere and anytime. It is assumed that such type of teaching backs up the improvement of the scientific competence of engineering students [13–14].
- Note also the design of mandatory standards for the measurement, grading, and prediction of students' education results, while there are easy assessment methods [15]. Yet, there is something to be done to assess the adequacy of the existing methods and the related practical results, and digital literacy and the designed methods of its acquire are not to be disregarded. On the other hand, the test of their efficiency is still actual, since the latter is a condition for the design of a unified information educational space.

UNESCO executed a project "Education for environmental sustainability – Good practices" where the task was students' preparation for the challenges of the successful market realization. Moreover, they were to be equipped with knowledge of science recent achievements. At the same time, it stressed environment preservation – now and in the future. As stated, universities should guarantee high-quality education combined with excellent practical skills, oriented to sustainable development. Yet, the future specialist should have acquired skills for individual learning. He/she should also possess key competencies formulated in the European Competence Framework (2006/962/EC): (i) Communications in the native language; (ii) Communications in a foreign language; (iii) Mathematical competence and basic competencies in natural

sciences and technologies; (iv) Digital competence (use of digital technologies for information and communication); (v) Skills for individual learning; (vi) Special and civil competences; (vii) Sense for culture. The global ideas of keeping the national character, and cultivating and keeping national values and regional characteristics are part of the European requirements to the highly educated persons [16]. This is a solid basis for the wholesome public and personal realization of a young specialist. The skill for individual learning combined with mathematics, natural science, and digital literacy is a good guarantee for professional mobility (acquire of new professional skills) and easy adaptation to the rapidly changing needs of the labor market. Yet, the role of education is decisive. Today students, having acquired those skills and competencies, will be tomorrow participants in and executers of EN programs and decisions, obeying the directives of EU and EP and the acts of the Bulgarian authorities for sustainable construction. Their work will be decisive in the integration of Bulgaria into the group of leaders guaranteeing Europe's sustainable future. Locally, sustainable development yielded the introduction of university courses on "Sustainable development", "Construction and ecology" etc. (in Higher School of Civil Engineering "Lyuben Karavelov", Varna Free University "Chernorizets Hrabar", the European Polytechnical University and others). Some of the engineering colleges teach also construction waste recycling as a specific discipline. The new requirements to the management of construction waste impose the current extension of the programs of project management. Note the positive tendency that all conferences in the field held during the current decade include topics of sustainable construction. VFU "Ch. Hrabar" is an example where a master class on "Sustainable development – a motor of construction innovation" is taught. The start of a new master program "Strategy for sustainable development and innovations" is also planned.

The outlined framework requires education orientated not to fact-finding and knowledge gather but to the cultivation of competence and training of personalities and not merely specialists. The specialists should be ready to develop and manage projects applying information technologies. They are supposed to work under the prevailing circle economy and should be brave, people-loving, and relying on the energy of change, i.e. just leaders. The experience of Volkswagen- Slovakia is noteworthy were a B.S. "Plus" program is underway, cultivating not only theoretical and practical knowledge but also communication skills, project management, teamwork, etc. Students undergo training during the vacations after the first two years of study. They work in a plant during the third year acquiring practical skills and return to the

university during the fourth year to prepare their diploma theses. Initially, they have a mentor who introduces them to the entire process of automobile construction, stressing their specialization during the third year of study. The program aims to find highly motivated young people intending to work on their future.

France purposefully invests in skills. This includes the motivation of young people who have B.S. or M.S degrees and work for companies or the administration, to attend 3, 6, and 12-months university courses. The 3-month courses aim to introduce the young people to the novelties in the respective field, while the 6 and 12-months courses are to solve problems posed by the employers, apart from the introduction to novelties. Having completed the specialization course, they defend a thesis in front of a commission including an employer's representative. The successful defense opens the way to further professional development of the young specialist, while the failure – to his dismissal and recovery of employer's funds. Some companies send outstanding young people with a B.S degree to continue their education by working on an M.S thesis. Bulgaria can adopt this practice thus preparing young specialists to meet the challenges of sustainable development.

3. CONCLUSIONS

The COVID-19 pandemic, digital transformation, and Europe's recovery plan pose an acute issue to construction, including sustainability and new requirements. The responsibility of the branch as one of the main EU employers and motors of the economy is enormous. Education including construction is an important factor in the economic growth and development of nations. It should account for the challenges of the digital transformation and COVID-19 pandemic addressing the education of specialists bound to transform Bulgaria and Europe into climate-neutral entities.

Bulgaria's prosperity requires the joined efforts of construction specialists, branches, governments, and public administration in tackling current issues and challenges. The history of the Third Bulgarian State proves that the union around the national idea and consistent work guarantee successful development.

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