

ARCHITECTS' PERSPECTIVE ON SUSTAINABILITY IN SERBIA: ESTABLISHING KEY TOPICS

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This article deals with the problem of sustainable architecture and planning in Serbia. It starts by describing how environmental, social and economic global problems are multilayered, complex and interrelated. It continues by tackling the issues of sustainable development on a local level, highlighting architects' role in building a more resilient future. It proposes a set of key social, environmental and economic sustainability topics and indicators arising from the contemporary international research. The research results are expected to act as an invitation and stimuli for architects and planners, especially in Serbia, to reconsider their practice and start to observe their work through a prism of sustainable development.

Key words: sustainable development, sustainable architecture and planning, sustainability key themes, Serbia.

INTRODUCTION TO GLOBAL CHALLENGES AND SUSTAINABLE DEVELOPMENT ¹

The talk about sustainability, as a leading concept for solving ever-growing number of environmental, economic and social challenges, is rare in Serbia as well as in the whole Balkans region. When architects occasionally describe their buildings as sustainable, a lack of deeper comprehension of what sustainability means is obvious. In these cases only one dimension of sustainability is mentioned – the environmental one. Therefore, it is no wonder that there are very few experts in the field of sustainable architecture.

In addressing this problem a group of architects and construction engineers from the University Union-Nikola Tesla, initiated the project "Innovative, Intelligent Eco-Concepts, Technologies, Materials and Constructions Aimed at Improving Sustainable Development Processes in Spatial Planning, City Planning, Architectural Design and Building in the Natural and Built Environment", and obtained the funding from the Serbian Ministry of Education and Science (MES, 2011).

Scientists claim with confidence that "the global average net effect of human activities since 1750

has been one of warming" (Solomon *et al.*, 2007:3). If we want to bring to a halt this galloping climate change, the biggest industrialised countries must reduce CO₂ emission by 80-95% by 2050 (Parry *et al.*, 2007).

Unfortunately, this is not the only negative effect humans have on the environment. Since the industrial revolution, unprecedented technological, industrial and scientific growth led to increased consumption of resources, increased wealth, better health, and population explosion (Goudie, 2005). Today, this translates into serious problems.

– 38% of Earth's surface area is appropriated for cultivated land (FAO, 2009), 47% of world's forests are lost and 50% of the Earth's wetlands vanished (WRI, 2010). This seriously impacts the climate, biodiversity, global water cycle, and the quality of air, soil, and water (Clarke, King, 2006).

– Population growth is tightly related to consumption. The Western world consumption levels are so high that there is not enough biologically productive land to provide all the resources needed and absorb the waste produced by an average global citizen (WWFN, 2008). Moreover, most of the growth will happen in booming economies, like those of India and China, where people aspire to live according to the Western world standards.

– Cities take up 3-4% of the Earth's surface area, and use 80% of its resources (Parry *et al.*, 2007). The problem is that cities, especially in the Western world, are top energy and resource consumers. They are highly dependant on unsustainable fossil fuels. As the global supplies are diminishing, many countries are forced to import resources from other nations (WWFN, 2008). This is exactly what leads to political instability, social tensions, disruptions and even wars.

– 47% of all people live in urbanised areas, and it is expected that that percent should increase to 60% by 2030 (Parry *et al.*, 2007). As cities are seen as places where dreams of a better life, salvation, and social empowerment come true, people are constantly migrating there. As these people come from a totally different cultural background, this results in exclusion, lack of participation and ghettoisation of newcomers. Unfortunately, poorly planned integration programmes are not giving any significant results (Davis, 2006).

– In a failing society business cannot succeed. After the 1950s the population of the planet doubled, food production tripled, energy consumption quadrupled, and global economic activity quintupled (NRC, 1999). Clearly, as communities grow, the environment declines. Therefore, capitalism must be seriously reconsidered, as otherwise Earth

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will continue to be just a mere resource for exploitation, treated as a commodity (Bookchin, 2004).

- Contemporary problems are also the result of dysfunctional social arrangements (Bookchin, 2004). Thus, solutions should not be sought just in technical, biological, physical and economic studies. A better understanding of the essential social processes must be incorporated.

Clearly, people on the planet Earth are not living sustainably. Sustainable development is a paradigm proposed as a guideline for solving previously mentioned problems. This paradigm "...is about stabilising the currently disruptive relationship between Earth's two most complex systems – human culture and the living world" (Hawken, 2007:172). This concept is very broad and differently interpreted by many authors with various educational backgrounds, thus it lacks consensus. It is not always understood that sustainability is not a destination that could be reached, but a constant work towards a better future. Lastly, when we discuss sustainability, all the "pillars", i.e. environmental, economic, and social factors, have to be taken into consideration. It is precisely these facts that make the implementation of sustainable development arduous. Therefore, challenges must be discovered and actors mobilised at the local level, and at the level of municipalities, cities and regions (Camagni, 2002).

THE ROLE OF ARCHITECTS IN CREATING A MORE SUSTAINABLE FUTURE

When architects are faced with the concern for our planet's current condition, not all of them react in the same way. Not all architects are able to comprehend the broader context of their work and take greater responsibility. Hence, architects and their work are sometimes perceived as a part of the problem, and sometimes as a part of the solution. For example, architects can affect people's health through a building design. "Sick building syndrome" is the result of architects' lack of knowledge about heating, ventilation and air conditioning principles; about materials that contain volatile organic compounds; and about insulation technologies that can lead to the potentially deadly mould growth. Additionally, architects and their designs affect people by deteriorating the natural environment. Lack of social engagement and responsibility, narrow and parochial views, egocentricity, overemphasised individualistic design statements, and devaluation of the natural environment can, unfortunately, be seen in many architectural practices.

On the other hand, many architects are trying to

contribute to the solution of the problem by planning and making interventions in the built environment that respect nature and minimise the impact on the environment. Only in this way can they enable their buildings to live in harmony with the environment. Through their design, architects are able not just to sustain the neutral position by not harming people and the environment, but are in the position to affect them therapeutically. Recent research shows that views on the natural surroundings from hospital buildings help patients recover faster, use less medication, and reduce levels of aggression (Lawson *et al.*, 2003). Clearly, architecture is not a panacea, but it can, and should, be an agent of change.

Moreover, the building design should truly reflect the ongoing search for expressing our solution to the ever-growing number of global and local challenges. Some of the results of this approach are today's zero carbon buildings, and buildings designed with sustainability in mind. The list of architects that made enormous effort and took responsibility to make this world better and more livable place is long (see Sinclair and Stohr, 2006). Great examples of such practice are the Beddington Zero Energy Development (BedZED) in the United Kingdom (Chance, 2009) and the Solar Ship in Freiburg, Germany (Goethe-Institut, 2006). Both settlements use advanced technology for creating positive balance of energy. Not only do they reduce the environmental impact, but they also support the social involvement of community, reduce operating and living costs, thus contributing to social and financial effectiveness. It has been argued that buildings designed in this way can have a direct effect on how people assimilate, learn, and integrate with each other, and how we, as a society, can live sustainably. These buildings have the potential to teach and convey messages through which sustainable principles materialise. Therefore, buildings can make us feel, and they can make us think, and therefore the whole building can be a lesson (Goldberger, 2009).

Architecture is influential profession and there is enormous potential for architects to address the change towards a more sustainable future positively. Design can play a crucial role because designers give new forms to various needs of the future (Bell and Wakeford, 2008). Today "architecture and all design professions are undergoing a major transformation that is both proactive and reactive: proactive as a search for roles with a greater relevance, and a reactive as a response to the humanitarian and environmental crisis facing the world" (Bell and Wakeford, 2008: 8). Architects have to be

able to analyse the past and the foreseeable future, they have to recognise, isolate, define, and solve problems. Secondly, they have to be acquainted with local challenges to which architecture must respond. This enables them to create buildings that can act as local stabilisers and safeguards of the future. Architects have to realise that power implies certain responsibility as well. As Sinclair and Stohr (2006:25) explain "we have to recognise that acting in the world means taking responsibility for the consequences of those actions". Adopting previously mentioned principle, architects and their designs can act as catalysts of change on our way to a more sustainable future.

PROBLEMS WITH SUSTAINABLE ARCHITECTURE IN SERBIA

When labelling buildings as sustainable, architects in Serbia usually focus on the environmental impact only. As mentioned before, it is necessary to develop deeper comprehension of what sustainability actually means. This approach, called "shallow" by Harding (1997), implies that through recycling, saving resources and reducing carbon dioxide emission, architecture can reduce its impact on the environment and contribute to a more sustainable life. Through their work, architects are able to do much more. They are in the position to affect our choices, preferences and human behaviour in general (Ledoux *et al.*, 2005). Many experts stress this is exactly what we need to transform our life on the planet into a sustainable one. Unfortunately, these and similar ideas are shyly penetrating academic and architectural circles in Serbia.

However, some architects have observed that "spatial and urban planning shows a number of arbitrary and inappropriate paradigms, unrelated and unbalanced connections between physical, architectural, urban landscaping and structures, capabilities, capacities and possibilities" in relation to sustainability; and stress that "there is an urgent need to correct and properly direct that entire range for the benefit of local community" (Milošević, 2011:13). Additionally, some environmental, economic, and social aspects of sustainable architecture have been discussed. For example, Pucar and Nenковиć-Riznić (2007) considered legislative frame for energy efficient buildings; Stevanović *et al.* (2009) explained the potential of solar energy usage in residential buildings; Crnčević (2007) stressed the importance of public participation. It is clear that the debate on this topic is existent and alive in Serbia. Though, there is much to be added in order to prevent the

discussion from being fragmented and incomplete. For that reason, several factors that impact the lack of understanding of what sustainable architecture is will be delineated.

The Serbian National Sustainable Development Strategy has thoroughly analysed the majority of environmental, social and economic challenges since 2008 (MEMSP, 2008). Furthermore, according to the Millennium Developmental Goals, national aims were set and indicators established for monitoring the progress. The strategy states that for the purpose of reaching a more sustainable future active involvement is necessary on all professional and institutional levels. However, it does not suggest any sub-strategies or institutions responsible for providing guidelines on the participation of different professions. Additionally, to our best knowledge, there are no financial mechanisms (except programs for monitoring the sustainability parameters), supporting the involvement of the wide range of professionals.

Moreover, in professional architectural magazines, as well as peer reviewed journals, eco or green architecture are often confused with the sustainable one. To a certain extent, this misinterpretation occurring in popular magazines can be understood. Yet, some fragmented and incomplete definitions of sustainable architecture, such as "sustainable architecture presumes environmental considerations, then the use of passive solar systems, protection from the adverse conditions of climate, noise and micro location" (Marić, Manić, 2006: 48); or "the most important principles of sustainable development on which (architectural) design is based are: producing and storage of heat acquired from solar energy, using passive cooling and heating, reduction of heat loss through walls, and using systems that do not pollute the environment" (Savić and Milanović, 2010: 121) are just deepening the sustainable architecture understanding gap.

Lastly, the competitions and awards celebrating eco buildings and classifying them as sustainable, are not contributing to better understanding of sustainable architecture. To illustrate this – a live-and-work building was built in Belgrade city centre three years ago. A positive fact is that smart systems for communication, lighting, cooling/heating, fire safety and security were applied, and one economic sustainability issue – operating costs decrease – was carefully considered. It was predicted that the smart systems used could reduce the energy consumption by 30%-40%. On the other hand, the building was built on a

park space, further reducing already scarce green areas in the city centre. Secondly, the building narrows a pathway through which Belgrade's city centre is naturally cleansed by air flow. Thirdly, no social sustainability factors were taken into consideration. It is clear that the building could be defined as eco or green, but certainly not as sustainable.

KEY TOPICS AND INDICATORS OF ENVIRONMENTAL, SOCIAL AND ECONOMIC SUSTAINABILITY

Some of the most challenging issues relating to sustainability are common to Serbia, as well as to other countries globally. They represent a shift from short-term to long-term perspective, a fragmented and incomplete understanding of how ecosystems are indispensable for human existence, and ignorance of the fact that destructive human impact on the environment has its limits (Edwards, 2005). Therefore, until today, a large number of themes and indicators have been developed so the human impact on the environment could be assessed and monitored. They are considered to be very useful for Serbia as well.

It must be pointed out that they are the most useful once sustainability is defined and indicators determined at local level (McKenzie, 2004). Definitions and themes derived at global

level are sometimes too broad to use in the local context. Additionally, when a problem or a situation at local level is approached with a pre-existing set of themes and indicators, there is a danger of overseeing the main challenges. Therefore, the set indicators suggested here could be used as a framework or guidelines for further exploration of themes and indicators. Sustainability themes will be presented and accompanied by their main indicators (Figure 1.). Architects and planners should cooperate with community members while discussing both adaptation and further development at local level, in accordance with the existing problems, interests and needs, so as to be entirely relevant.

Environmental sustainability and its main themes

Decisions on the land use are key to sustainability – they determine human connection with natural and built environment, housing and transportation patterns, access to diverse services, and, lastly, the quality of our life. Decisions on the land use mix (decisions about the land appropriated for residential, commercial, industrial and green areas) (Tomalty *et al.*, 2007), have a significant effect on the growth direction in urbanised areas, reduction of pressure on farmland and nature, the costs of building and maintaining the urban

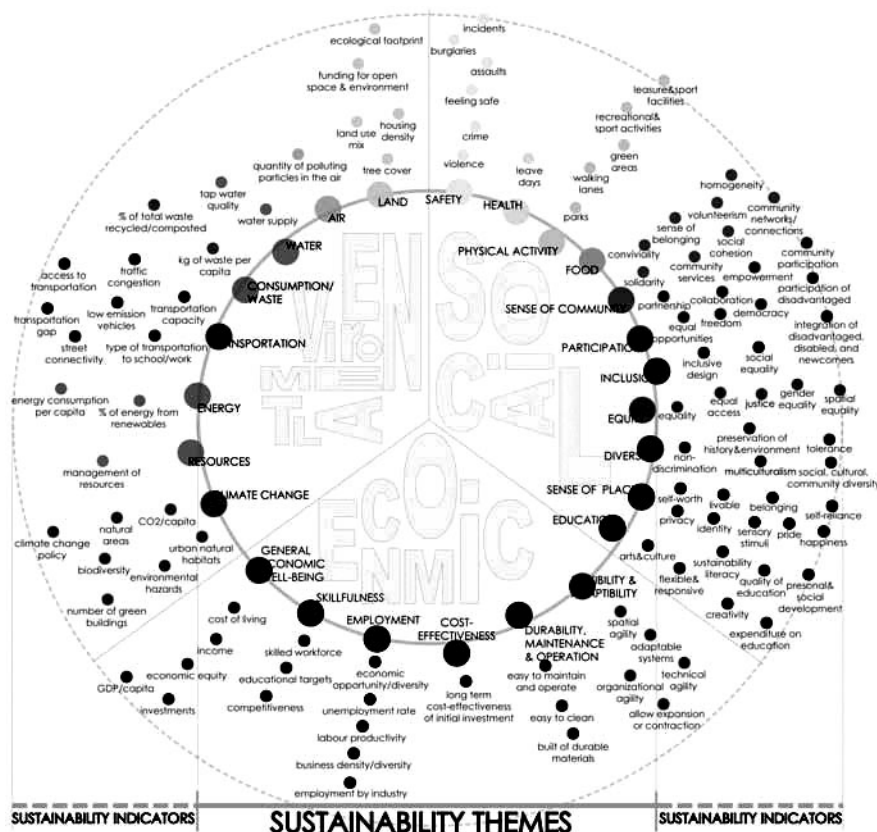


Figure 1. Sustainability key themes and indicators (Authors' compilation)

infrastructure, and the costs of community services (FBC, 2010). A careful land use planning implies a more compact community design. In this way CO₂ emission is reduced, air quality improved, and public health increased. Besides, the existence of local services and jobs enables biking and walking to school or work, and promotes effective transportation (FBC, 2010).

The air quality is one of the most significant characteristics of our environment. Today a large number of deaths occur due to exposure to air pollution. Additionally, child asthma, low weight at birth, and premature births are brought in connection with air pollution (FBC, 2010). All the mentioned reasons suggest the quality of air should be monitored.

Apart from the quality of the air, water quality is also important indicator of environmental conditions. High quality water, as well as steady and secure water supply, is a prerequisite for leading a good life. It is of utter importance that the water infrastructure is carefully planned, since a long distance water import increases energy consumptions (BIS, 2010). Additionally, potential construction sites must be organised in a way to keep pollutants away from the water.

Excessive consumption leads to excessive waste production. Devising construction strategies, practices and policies for diminishing consumption and waste generation is of crucial importance. It is known that stimulating local production and buying local materials significantly decreases the use of fuel and greenhouse gas emissions, which result from a long distance transportation of materials (FBC, 2010).

Nowadays, transportation is regarded to be a major contributor to greenhouse gas emissions. Therefore, it has been suggested that compact communities should be planned. Since there are local services and employment opportunities in such communities, it means that cycling and walking could be regarded as attractive and useful activities. In this way a number of vehicles on the road could be decreased. Furthermore, the good quality transportation system reduces the pressure on agricultural land and green areas, thus diminishing its impact on health, climate change and degradation of the environment (Ledoux *et al.*, 2005). Transportation also contributes to social equity. A diverse transportation makes services more available to everyone, households less dependent on their own cars, and household costs lower (FBC, 2010).

Natural resources provide all the life necessities such as food, water, air, habitats,

as well as different raw materials. Although the nature has the ability to adapt to small changes, the results of architects' and urban planners' activities (appropriation of green field for construction sites, use of unsustainable materials, excessive energy consumption by buildings, etc.) can have serious negative effects. For this reason, during the planning phase architects must assess how their building design will interfere with the health and sustainability of ecosystems in which architects immerse their designs. The architectural and urban design must be examined as a part of complex interrelations of socioeconomic and environmental factors. This is crucial, since new constructions make changes in ecosystems.

Energy consumption has dramatically increased lately. In spite of the boost in renewable energy use, the worrying fact is that fossil fuels and gas use are constantly growing (Ledoux *et al.*, 2005). Thus, CO₂ footprint must be reduced, both during the construction and the occupation time of a building (BIS, 2010).

Social sustainability and its main issues

In the last couple of years social sustainability has gained importance within the sustainability agenda. Until the 2000s, social sustainability was not in the focus of policy makers, unlike environmental and economic sustainability. This is due to the fact that sustainability was born out of two movements – environmentalism in the 1960s, and „basic need“ in the 1970s, and also because social aspects are hardly quantifiable, thus hard to measure (Colantonio, 2008). A literature review revealed that in most cases the social sustainability was entwined in discussion on creating socially sustainable communities, neighbourhoods, cities and urban environments (Barron and Gauntlett, 2002). The set of the most important issues discovered will be presented and discussed in the following text.

People want to feel safe and secure in their communities. They need a safe and secure environment, safe streets and safe city, safe and secure living and working conditions for so they can plan their future (Barron and Gauntlett, 2002). This is the first social sustainability issue, and a large number of indicators have been used so far (Figure 1.) to assess it.

Sustainable development is not achievable when devastating illnesses exist, nor is good health maintainable in places where bad environmental conditions prevail (von Schirnding, 2002). Thus, health is another key social sustainability issue. It is obvious that human well-being and health depend on their

environment – both natural (air, soil, water, food) and built (neighbourhood, housing and traffic). In an urban environment people's health is strongly determined by social, economic, political, cultural and physical factors. These include migration, social aggregation, industrialisation and modernisation, as well as urban living circumstances (WHO, 2010). Moreover, not only does the human environment affect physical health, but social and emotional as well – the health of spirit, mind and body. From this perspective, it is clear that health is one of the main factors affecting the quality of life (McKenzie, 2004). For all these reasons, health should be seen as a key issue of both social and environmental sustainability.

Physical activity is recognised as one of the leading factors influencing physical and emotional well-being. Therefore, whenever possible, architects and urban designers should try to incorporate the opportunities for physical activity in natural and built environments.

Safe, secure, healthy, and reliable food supply is one of the most important factors influencing health and well-being of all people. Due to extensive agriculture and its negative effects on the natural environment, and the increasing concern for financial costs and environmental consequences, food quality (especially locally produced) is rising on the sustainability agenda (FBC, 2010). City farms, roof farms, community gardens and raised beds in school yards are among many interesting examples of how architects tried to engage their communities in producing food on local levels.

Sense of community is a feeling of belonging among community members. It means building civil and social capacity – „social networks and the norms of reciprocity and trustworthiness that arise from them“ (Putnam, 2000:19). Therefore, civil and social capacity do not consist of a number of institutions, connections and standards – they include multitude of social interactions which glue everything together. Designing spaces within neighbourhoods (parks, patios, plazas, etc.) that invite neighbours to stop, talk and socialise means strengthening the sense of community, and strengthening good connections within the community. Such a space could assist community members to meet, develop mechanisms for discovering their strengths and weaknesses, and also develop their ability and responsibility to pass the awareness of social sustainability on the next generation (McKenzie, 2004).

Participation is one of the crucial characteristics of a democratic society. Democratic governance

toward sustainable development must entail a broad vision and deep democratic practice. All citizens must be involved and encouraged to take part not only in elections, but in various political and decision making activities as well, particularly at local level (McKenzie, 2004). Therefore, architects and urban planners should start consulting occupants on all matters relevant to them. Participatory design process is a true expression of one's democratic right to be involved in every decision making process regarding their living environment. This process can enable all the members to articulate their needs and wishes, which are later carried out in the form of a building design. Secondly, all the policies regarding the later use of the building, the ones that take into account members' opinions, will be efficiently and effectively delivered, because they are in tune with the members' requirements and needs (Rydin and Pennington, 2000).

Inclusion and equity as important social sustainability themes are defined as an opportunity and right for all members to contribute to and participate in community life, have an access to community resources thus working toward carrying out community goals (City of Vancouver, 2005). Social interaction, support and access to various spaces foster inclusion (Barron and Gauntlett, 2002). For this reason, architects and urban planners should respect the principles of inclusive design or "design that recognises the diversity of users, regardless of their ability, age, gender, income, sexuality, race, and culture" (Morrow, 2000:48). This means that the places they design can be approached, entered and used by any individual, regardless of their abilities (Pivik, 2010). By creating opportunities and facilities meant for community members to meet, they are less exclusive of disadvantaged people, the disabled and new community members, and more inclusive of all age, cultural and ethnical groups.

Additionally, socially sustainable communities value different views, integrate a myriad of cultures, promote their positive characteristics (McKenzie, 2004), appreciate and celebrate difference, and see this as strength not weakness. For this reason, spaces that accommodate local celebrations and events, promote cultural heritage, local nature, and history are crucial (Barron, Gauntlett, 2002).

Stedman (1999:765) defines the sense of a place as "meaning and attachments that community residents have towards their community". Unique community ethos and identity should be interpreted through design. In this way community members could be

proud of it and cherish it. Such spaces are liveable and friendly. They are places where members can live their values and be happy. They also contribute to the sense of belonging, self-worth and sense of self reliance; they allow privacy and enable connection with nature (Barron and Gauntlett, 2002).

Education enhancement is one of our top priorities on the road toward a more sustainable future. Education has a central role in transforming our life on the planet into a more sustainable one. Hence, a decade of education for sustainable development, from 2005 to 2014, was announced. This declaration states that education has the power to affect behaviour and provide pupils/students with the key competencies for the journey towards a more resilient future. According to this, the education of architects and urban planners should be changed. They should be informed about the importance of the sustainability approach in design from the very beginning. In order to fully comprehend the challenges of sustainable architecture they should be immersed in real life projects and designs in their local communities. By tackling the questions of energy consumption, land degradation, health, transportation, etc. through their design, they will be empowered to contribute to finding proper solutions. Thus, they will be given the opportunity to become highly conscious experts.

Economic sustainability and its main themes

Sustainability is supposed to include justice in the domain of humans of different generations, humans of the same generation and humans and nature (Baumgartner and Quaas, 2010). Economics is defined as efficient satisfaction of human wants and needs. So, "sustainability economics" means efficient relationship between humans and nature over distant future. Discussions about economic sustainability relevant to architects and planners, are usually dealing with both sustainability of communities and sustainability of buildings.

Local communities must utilise their own solutions to global economic problems, and create a long-term capacity. In this way, architects and urban planners, assisted by economic experts, must consider a series of economic sustainability indicators before proposing any infra- or suprastructural changes or additions. Some of the most commonly used are: general economic well-being or GDP per capita (Gross Domestic Product per Capita or capability of a certain economy to provide welfare to its population), investments, income, economic equity and living costs

within a community (Baumgartner and Quaas, 2010). These indicators show whether a community can meet its needs, be secure, be able to participate in a society, and whether there are significant inequalities within the community. Furthermore, skillfulness of the local community should be examined in the planning and construction phase of the project, and employment opportunities arising from the project must also be examined, as they will immensely impact the project implementation costs. All of these indicators signal the economic performance of a community, and help architects and urban planners propose the best quality design for the amount of money a community can afford at a certain moment.

Economic sustainability of a building is usually assessed by using cost-effectiveness, durability, maintenance and operation, and flexibility and adaptability as key issues. Cost-effectiveness of a building means examining whether the initial investment is cost effective long-term. Exploring the quality of the building, as well as all the materials and systems used, will assess potential durability of both the building and all its elements (CABE, 2008). Third issue - maintenance and operation, analyses whether the building, together with the built-in systems, is easy to maintain, operate and replace (CABE, 2008). The last issue - flexibility and adaptability - questions whether the building design will allow flexibility and adaptability on day-to-day basis, and in the future as well (if the future extensions are predicted; are the services grouped so that the costs of interior reconfiguration are reduced; is rapid expansion of technology taken into consideration) (CABE, 2008). In other words, spatial agility (can space be easily rearranged), technical agility (can ICT and light be changed easily) and organisational agility (can space be reconfigured) should be explored before the building is built (EQES, 2009).

CONCLUSIONS AND RECOMMENDATIONS

On the way to a better tomorrow all professionals should make certain contributions. Architects and urban planners also belong to this group. The evaluation of sustainable architecture in Serbia reveals that there is much more room for improvement. The question of broad and holistic understanding of all three aspects of sustainable design must be dealt with. As practitioners, architects and urban planners, as well as those working in academia, are supposed to contribute to the debate on the matter. Realising this, we assembled a series of key social, environ-

mental, and economic sustainability issues arising from the contemporary international research. These issues should be considered by architects and planners working in the built environment sector, as well as by professors and students in architectural design and planning studios. Moreover, this set of issues should not be seen as definite, inflexible and rigid. It has been suggested that the set should serve as a framework or guidelines for further research. Architects, planners, professors and students of architecture should adapt and develop it further, at the local level, with the local communities, in accordance with the existing problems, interests and needs, so as to be entirely appropriate and relevant.

The framework will aid to deeper understanding of the main sustainability issues, provide a solid background for future explorations of the topic, and enable initial evaluation of architectural and urban design. Hopefully, the results of this article will act as an invitation and stimuli for architects and planners, especially Serbia, to reconsider their work in academia and practice, and start observing their work through the prism of sustainable development.

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