

SUSTAINABLE CONSTRUCTION IN LATVIA – OPPORTUNITIES AND CHALLENGES

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Abstract. Construction industry has a significant and substantial role in Latvian economy. Construction volume and the number of employed in the sector have increased, but the fierce competition in the industry is not contributing to the profit growth of the enterprises in this sector. In the times of climate changes and globalisation researches involving security of long-term environment, saving of the resources, as well as preservation of the identity and singularity of places are activating. Long-term building involves complex solutions and practice that increase the efficiency of houses, diminish the consumption of the energy, water and other natural resources, their building and management processes material input per unit, power-intensity and negative impact on the people health and environment. Long-term building ideas developed in other countries known as sustainable building are becoming more popular also in Latvia. That is stimulated with the help of many conditions: economic (necessity of saving resources and energy), social (market-dictated by the consumers, high demands for the quality and accommodations), as well as activation of the environmental issues (talking responsibility for diminishing of the climate changes and pollution). In this paper sustainable building and management basic principles are inspected. The article provides analysis of the situation in the construction sector in Latvia from the point of sustainability, discusses the challenges, opportunities and threats to sustainable development of construction.

Keywords: construction industry, long-term environmental development, sustainable building.

Introduction

According to the Latvian Sustainable Development Strategy 2030 sustainable development has a strong sociocultural connotation in Latvia. The first SD priority is “the development of culture space of Latvia, because the identity of a strong and creative nation lies in unique, inherited and newly created material and spiritual values”. According to the Strategy 2030, the following indicators should be achieved by 2030: proportion of recycled waste from total waste collected annually: >80 %, productivity of use of natural resources EUR/tonne of resources: >1550, greenhouse gas emissions per year (percentage change compared to emissions in the base year, Kyoto Protocol) <45, proportion of special areas of conservation within the state territory: at least 18 % [1]. This development is seen in a long-term perspective, with the goals to be reached by 2030. The guiding principles for reaching these future goals are established in the NSDS, while the guiding principle of the NSDS is the “capital approach”. “Capital” in the Latvian context is understood in its widest terms, with a particular emphasis on the “social and natural capital”. “Social capital” refers to interaction among people, their cultural heritage and creativity, and “Natural capital” – the environment and natural space of Latvia, which is seen as necessary for social wellbeing. In order to apply the “capital approach”, some underlying attributes and principles in the society are vital: creative activity, tolerance, cooperation and participation [2].

Sustainable development has broad appeal and little specificity, but some combination of development and environment as well as equity is found in many attempts to describe it. However, proponents of sustainable development differ in their emphases on what is to be sustained, what is to be developed, how to link environment and development, and for how long time. Despite the persistent definitional ambiguities associated with sustainable development, much work (over 500 efforts) has been devoted to developing of the quantitative indicators of sustainable development. The emphasis on sustainability indicators has multiple motivations that include decision making and management, advocacy, participation and consensus building, and research and analysis.

2015 was an important, even symbolic, year for a more sustainable future. In September the United Nations agreed on the 2030 Agenda *Transforming our world: the 2030 Agenda for Sustainable Development*. With it comes the 17 Sustainable Development Goals, SDGs, each one with several targets (a total of 169 targets). One of the Sustainable Development Goals is – sustainable cities and communities, to make cities and human settlements inclusive, safe, resilient and sustainable [3].

Another huge leap forward in 2015 was the Paris Climate Agreement in December [4] and the 2015 United Nations Climate Change Conference, COP 21 or CMP 11 was held in Paris, France, in

December 2015. It was the 21st yearly session of the Conference of the Parties (COP) to the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and the 11th session of the Meeting of the Parties to the 1997 Kyoto Protocol. The result was an agreement to set a goal of limiting global warming to less than 2 °C compared to pre-industrial levels. The agreement calls for zero net anthropogenic greenhouse gas emissions to be reached during the second half of the 21st century. In the adopted version of the Paris Agreement, the parties will also “pursue efforts to” limit the temperature increase to 1.5 °C. The 1.5 °C goal will require zero emissions sometime between 2030 and 2050, according to some scientists [5].

“Sustainability” is one of the world’s most talked about but least understood words. Its meaning is often clouded by differing interpretations and by a tendency for the subject to be treated superficially. For most companies, countries and individuals, who do take the subject seriously, the concept of sustainability embraces preservation of the environment as well as critical development-related issues such as efficient use of resources, continual social progress, stable economic growth, and eradication of poverty. In the world of construction, buildings have the capacity to make a major contribution to a more sustainable future for our planet. The OECD, for instance, estimates that buildings in developed countries account for more than 40 % of energy consumption over their lifetime (incorporating raw material production, construction, operation, maintenance and decommissioning). Add to this the fact that for the first time in human history over half of the world’s population now lives in urban environments and it is clear that sustainable buildings have become vital cornerstones for securing long-term environmental, economic and social viability. The pace of change means we do not have the luxury of time. With urban populations worldwide swelling by around one million people every week, there is an urgent need to come up with clever ideas that optimize sustainable performance of the buildings that we live and work in.

Building a sustainable future

According to the Construction Law, one of the basic principles is the principle of sustainable construction, according to which a living environment of good quality for current and future generations is created during the construction process, increasing efficient use of renewable energy resources and promoting efficient use of other natural resources for such purpose [6]. Sustainable construction aims to meet the present day needs for housing, working environments and infrastructure without compromising the ability of future generations to meet their own needs in times to come. It incorporates elements of economic efficiency, environmental performance and social responsibility - and contributes to the greatest extent, when architectural quality, technical innovation and transferability are included. Sustainable construction involves issues such as the design and management of buildings; material performance; construction technology and processes; energy and resource efficiency in building, operation and maintenance; robust products and technologies; long-term monitoring; adherence to ethical standards; socially-viable environments; stakeholder participation; occupational health and safety and working conditions; innovative financing models; improvement to existing contextual conditions; interdependencies of landscape, infrastructure, urban fabric and architecture; flexibility in building use, function and change; and the dissemination of knowledge in related academic, technical and social contexts [7].

The research object of the present research is construction in Latvia. The research aim is to analyse the main principles of sustainable construction and to identify problems and make suggestions about opportunities and challenges. Based on the aim, the following research tasks have been set: 1) analyse the main principles and target issues of sustainable development and sustainable construction found in literature; 2) give some examples of good practice in sustainable construction (results of competition “Most sustainable building and project in Latvia 2014”), 3) collect and analyse statistical data about Latvian construction to describe the importance of the construction sector and its diversity, 4) analyse the survey results among the construction sector professionals, students and teaching staff from point of construction management.

Materials and methods

The present research employed publicly available data of the Latvia Central Statistic Bureau (CSB). To achieve the aim and execute the tasks, the research employed secondary information being

summarised and published by the autor, the EU and Latvian scientists [7-15]. The research also analysed the available information on the basic principles of sustainable construction and criteria mainly from the point of construction management. In the work analytical, statistical, surveys and other methods have been used.

Defining sustainable construction

“Target issues” for sustainable construction are based on the sustainable construction concept and to make sustainable construction easier to understand the following is evaluated and applied [7]:

1. Innovation and transferability – Progress.
2. Ethical standards and social inclusion – People.
3. Resource and environmental performance – Planet.
4. Economic viability and compatibility – Prosperity.
5. Contextual and aesthetic impact – Place.

Sustainable or green building construction aims to embody the principles of sustainable development, i.e. environmental protection, economic development, and social development in the siting, design, building, maintenance and occupation of buildings. Sustainable buildings are designed and constructed to high environmental standards and thereby minimise energy requirements, reduce water consumption, use materials which are of low environmental impact, e.g., low embodied energy and resource efficient, reduce wastage, conserve / enhance the natural environment and safeguard human health and wellbeing.

For example, considerations for Sustainable Housing would include:

1. Environment: conservation and enhancement of the site ecology / biodiversity.
2. Energy: minimising the energy consumption, high levels of insulation, building orientation to maximise solar gains and shelter from prevailing winds, maximising daylighting, energy efficient lighting and appliances.
3. Water: consumption and water efficiency, rainwater reuse, water efficient appliances, minimising and attenuating surface water run-off to prevent flooding and pollution.
4. Transport: location near to public transport routes, proximity to amenities and places of work, space for home working – e.g., home office to reduce commuting.
5. Materials: use of long-life materials of low environmental impact during extraction, manufacture and use, avoid using toxic materials and those from non-renewable and non-sustainable sources, use of materials which can be reused / recycled, use of locally produced materials to reduce transportation requirements, use of recycled materials.
6. Health and well-being: use of non-toxic finishes and materials, natural daylighting, freedom from noise, indoor air quality, private outdoor space, green space, design for community and “sense of place”, integration with the surroundings / landscape.
7. Affordability: minimize the cost of ownership – if it is not affordable – it cannot be truly sustainable, flexibility and adaptability to meet the changing needs of the present and future occupiers.

Sustainable building assessment and standards. Code for Sustainable Homes – (UK Communities and Local Government) is an environmental assessment method for new homes based upon Building Research Establishment’s Ecohomes. It contains mandatory performance levels in seven key areas (energy and CO₂ emissions, water, materials, surface water run-off, waste, pollution, health and well-being, management, ecology) and aims to encourage continuous improvement in sustainable home building.

Good Practice in Latvia

The Latvian Sustainable Building Council (LSBC), NGO, was founded at the end of 2010 as a private sector initiative to increase the sustainability of the built environment in Latvia. To increase the effectiveness of local efforts, in 2012 the LSBC joined the World Green Building Council (WGBC) – a network of more than 90 local organizations with similar main aims across 5 continents of our globe.

The LSBC activities are focused around the following three major interests:

- information and education activities with an aim to increase general understanding as well as professional knowledge;
- policy development activities with an aim to support local policy makers in developing sustainable policies for the Latvian building sector;
- practical support to sustainable project development.

The LSBC is a great place for networking and positioning organization within the sustainability leaders in Latvia. It is also a place to share ideas and develop new projects.

The good practice in Latvia is the competition “Most sustainable building and project in Latvia 2013, 2014, 2015” organized by the professional field editions “Latvijas Būvniecība” (“Construction in Latvia”) and “Latvijas Architektūra” (“Latvian Architecture”) and the Latvian Sustainable Building Council.

The purpose of the competition award is to shine light on the most successful examples and ideas of sustainable architecture, design and building that confirm significant impact on daily operation of the building, including costs. “Pay as you save.” This competition, where building sustainability is evaluated, happened for the third time in Latvia. The aspect of cultural heritage and national identity is very important in all objects.

For example, nomination “Most sustainable building in Latvia 2014” with the subdivision “Public outdoors object”.

1. place – office building in Dzelzava street 120Z, Riga, architect: Roberts Riekstiņš, contractor and builder: “Rīgas Industriālais parks” (“Riga Industrial Park”).

2. place – Žanis Lipke memorial museum building, Balasta dambis 8, Riga, project by “Arhitektes Zaigas Gailes birojs”, construction: “MG Būvnieks”.

3. place – office building “JUPITER CENTRE”, Skanstes street 7, k-1, Riga. Project by “Postform Projects Riga”, Roberts Riekstiņš, construction: “IMG Constructor”.

Recognition in the category “Public outdoors object”.

Jury recognition was awarded for observing the sustainability criteria in a public outdoor object.

The Daugava promenade part from the railway bridge to Salu bridge in Riga. Applicant, contractor: RDPAD (Riga City Council City Development Department), project: “Arplan”, construction: association of persons “Merks – Saldus ceļinieks”.

Nomination “Most sustainable project in Latvia 2014”.

1. place – residential building complex “Felicity”, E. Birznieka-Upīša street 13, Riga. Applicant and contractor: “Nāre”, developer: “Domuss”, project: “Birojs T22”; WESTFOURTH ARCHITECTURE PC.

2. place – the Riga Technical University (RTU) Creative industries centre, Āzenes street 18, Riga. Contractor: RTU, project: “Valeinis un Stepe”.

3. place – residential building with social care apartments in Piena iela 7, Riga. Contractor: “PIENA MUIŽA”, applicant and project: NAMS.

Jury recognition for the project “Apartment buildings in Biķernieku street 162”, Riga, for quality and promotion of favorable and sustainable socialization. Applicant and contractor: “NCC Housing”, project: “Sestais Stils”, construction: “NCC Konstrukcija”.

Recognition for the project “Multi-functional sports and recreation centre in Bauska” for the attempt to integrate sustainable building criteria in a socially significant project.

Nomination “Most sustainable students’ idea 2014”.

1. place – Reanimation of Sarkandaugava and remediation in Sarkandaugava, Tvaika street, Riga. Applicant: Ilze Rukšāne. Bachelor’s thesis, the Latvia University of Agriculture, Faculty of Landscape Architecture.

2. place – proposal for renovation of the Riga Building College (RBC) workshops, Gaiziņa street 3, Riga. Applicant: RBC 1. and 2. year students Aiga Daumane, Laura Zunda-Poča, Bruno Bitaitis, Anna Batarāga, Klāvs Lepsis. Lecturers Inese Reitāle, Gunta Ābele [16].

There are many examples of good practice in Latvia, however, to meet the BREEAM LV requirements is a major challenge.

Construction sector In Latvia

In order to judge the development of the construction and support of its importance, we get acquainted with the statistical data on the Latvian construction sector. The latest data compiled by the Central Statistical Bureau of Latvia (CSB) show that in 2014 compared to 2013 the construction production volume according to the calendar adjusted data at constant prices increased by 8.1 %.

In 2014, the construction production volume at current prices accounted for EUR 1801.6 mln, of which in the 4th quarter – EUR 547.3 mln. Construction of buildings increased by 33.7 %, of which construction of hotels and similar buildings – by 98.5 %, construction and repair of educational buildings – by 87.8 %, and construction of residential buildings – by 31.1 %. In turn, construction of civil engineering structures dropped by 9.3 %. It was affected by decrease in the volume of construction of highways, streets, roads, airfield runways, railways, railway lines of 2.4 %, and of main pipelines, communication and power lines – of 22.0 %. In turn, construction of local pipelines and cables last year grew by 25.3 %.

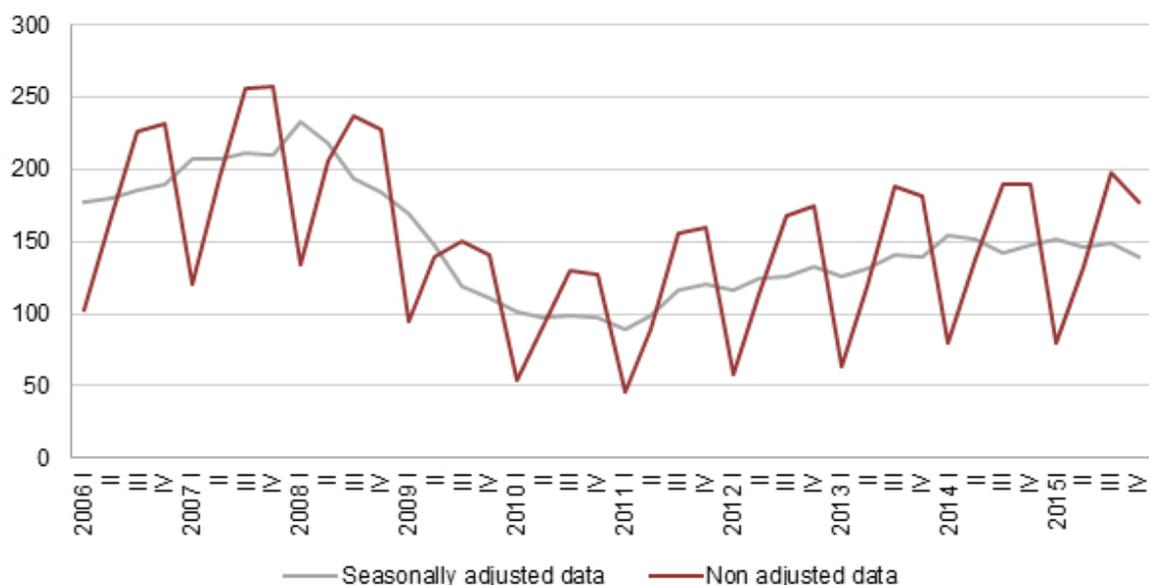


Fig. 1. Construction production volume index (2010=100) [18]

But in the 4th quarter 2015 as compared to the corresponding period of 2014 the construction production volume according to the calendar adjusted data at constant prices decreased by 6.2 %. Construction production volume at constant prices accounted for EUR 500.5 mln. Construction of buildings dropped by 8.5 %, of which residential buildings by 23.4 %, non-residential buildings – by 3.6 %. Construction of civil engineering structures went down by 3.9 % and it was affected by decrease of the construction volume of highways, streets, roads, airfield runways and railways by 12.2 %.

As it can be seen from Table 1, in 2015 as compared to 2014, the construction production volume according to the calendar adjusted data decreased by 1.2 % amounting to EUR 1743.8 mln at constant prices. Construction of buildings went down by 7 %, of which construction of residential buildings by 8.5 %, but construction of non-residential buildings by 6.5 %. In turn, construction of civil engineering structures rose by 5.2 %. Mostly increased the volume construction of local pipelines and cables – by 26 % and construction of harbours, waterways, dams and other water works – by 22.7 %. The volume of construction of bridges, elevated roads and tunnels significantly dropped – by 18.4 % and the volume of construction of main pipelines, communications and power transmission lines – by 11.1 %.

In 2015, 2038 building permits were granted for construction, capital repairs, reconstruction and restoration of single dwelling buildings with the total floor space of 402.1 thsd. m². 1383 or 68 % of

the building permits were granted for construction of new single dwelling buildings with the intended floor space of 281.6 thsd. m².

296 building permits were granted for construction of industrial buildings and warehouses with the intended floor space of 468 thsd. m², of which 151 building permits – for construction of new industrial buildings and warehouses with the intended floor space of 181.1 thsd. m².

Table 1

Construction volume and changes [17]

	Total (at current prices, mln EUR)		2015 as compared to 2014, % (calendar adjusted data at constant prices)	4th quarter of 2015 compared to	
	2015	4th quarter 2015		3rd quarter of 2015, % (at constant prices, seasonally adjusted)	4th quarter of 2014, % (at constant prices, calendar adjusted)
Total	1743.8	500.5	-1.2	-5.9	-6.2
Residential buildings, total	223.3	50.3	-8.5	-22.9	-23.4
Non-residential buildings, total	634.2	187.9	-6.5	2.9	-3.6
Hotels and similar buildings	40.1	15.5	9.1	22.8	52.9
Office buildings	94.7	32.5	-7.8	14.8	13.8
Wholesale and retail trade buildings	47.4	14.0	0.6	7.1	68.2
Industrial buildings and warehouses	99.9	21.5	-6.4	-36.1	-43.3
School, university and research buildings	92.7	17.3	-33.3	-18.4	-54.7
Hospital or institutional care buildings	45.6	15.9	19.5	34.6	115.2
Civil engineering, total	886.3	262.3	5.2	-8.0	-3.9

Results and discussion

Despite the many good examples of the sustainable construction field in Latvia, the construction sector has a lot of unresolved issues that are closely related to sustainability issues. The lack of the quality of construction work and the new Construction Law, which came into force on 01 October 2014, is a topical theme. During the survey, performed among the construction sector professionals, students and teaching staff on the problems of the construction process, it was possible to identify separate groups of problems: quality problems of work and processes, educational problems at the level of secondary and higher education related to narrowing of programs, ensuring of succession in education and the difficulties related to attraction of new specialists, due to low remuneration of the teaching staff, the problems of public procurements.

One of the basic reasons related to the decline of the construction quality is the problem of the educational system at the level of secondary schools and vocational schools. The exams in exact sciences for secondary school pupils are not compulsory anymore; as a result, the secondary school

pupils are insufficiently prepared for the studies of engineering at higher education institutions, and this causes the lack of new engineers and specialists in this particular sector. It is possible to observe problems also in higher education in relation to narrowing of the study programs, lack of succession, especially – in respect to the education of building engineers. The construction process is a team-work of an architect, an engineer and a construction specialist. In order to facilitate the team-work skills, at many Scandinavian universities, for example, the Technical University of Denmark, all or almost all study assignments are fulfilled in groups. Initially it seems that it makes the work easier to do; however, for the students of Latvian higher education institutions, who are used to carry out their work independently, it is difficult to work in a team, entering into the labour market. Within the study process it would be necessary to improve communication between the students of architecture and construction by developing joint projects, group-work.

The second group of the problems and deficiencies of the construction sector in Latvia is related to the shortcomings in the Public Procurement Law, prevailing of lower prices during the public procurement tenders. As a result, the projects are insufficiently developed and the degree of detailed elaboration quality is low, the entity performing construction faces additional unexpected work, and the construction becomes more expensive. We could adopt the example of Denmark, where there has been introduced “the universal tender” in order the lower price would not be the only determining factor, which can cause decline of the project quality. The first stage of a tender is assessment of the qualification, taking into consideration the portfolio of the elaborated work, annual office turnover and conceptual presentation of the idea in a form of text. At the next stage there are teams organized by including into them one architect, an engineer and a representative of those performing construction. Then the commissioning party states the requirements and limitations. At this stage of work, cooperation is very important, because the limited time of the project development requests considerable mutual flexibility. If there are shortcomings identified, the team is automatically disqualified.

Other factors hindering development are manifestations of shadow economy affecting the work safety and employees’ social guarantees. Already now there is a discussion in the sector on the possibility to introduce electronic ID cards for the people employed in construction. This would enable to control the movement of employees at the object and to identify those employed in the sector. The introduction of such system would give preference to qualified employees, but others would be motivated to improve their qualification. The quality of the construction process would be also facilitated by introduction of standard contracts. In Norway such contracts are freely available, according to the type and subject-matter of the contract, for example, general contractor’s contracts with the customer, contracts for projects of different volume on the performance of separate works ensuring additional protection for people employed in the sector etc. There is a uniform standard introduced in the EU and Latvia regarding the certification of construction specialists, performing construction and designing. The construction control is very important – it ensures the quality of all these works and processes. For example, in Norway there are experts of different construction sectors involved in control of an object, and each subcontractor shall ensure the presence of his representative in this construction project. This person assumes responsibility for the chosen solutions and technical quality. We should also point out the shortcomings of construction legislation – the bureaucracy process has not diminished following the adoption of the new Construction Law.

Conclusions

Construction is one of the most important sectors of national economy. The OECD, for instance, estimates that buildings in developed countries account for more than 40 % of energy consumption over their lifetime (incorporating raw material production, construction, operation, maintenance and decommissioning). Sustainable construction is a high-quality construction. If the necessary improvements will be carried out of the construction process quality, the construction will be more sustainable. General development of the construction quality could be facilitated by dealing with the above mentioned problems, which are identified during the survey from the point of construction management:

1. Quality problems of construction works and processes;
2. Lack of highly skilled workers in the construction sector;

3. Problems of the educational system at the level of secondary schools and vocational schools;
4. Educational problems at the level of higher education, taking into consideration also the experience of other countries;
5. Problems of public procurements;
6. Difficulties related to attraction of new specialists due to low remuneration of the teaching staff;
7. Manifestations of shadow economy affecting the work safety and employees' social guarantees, a possibility to introduce electronic ID cards for the people employed in construction.

It is important to think about development of the construction sector from the aspect of sustainability, paying particular attention to all above mentioned problems.

Recommendations that should be made in the near future are:

1. Reduce the bureaucratic obstacles;
2. Arrange the legislative framework, in particular with regard to building codes;
3. Continue to simplify the EU fund acquisition procedures and provide state and local government paid consulting project creation;
4. Provide more robust construction tendering processes and results, and to change the basic principles of tenders, where the construction costs are not used as the sole criterion.
5. To popularize smart home ideas from the perspective of sustainability.
6. Introduce BIM (Building Information Management) system solutions in the public building sector.

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