CERIS : Civil Engineering Research and Innovation for Sustainability

Hi-Timber – Sustainable High-Rise Buildings Designed and Constructed in Timber

Summary

"Sustainable High-Rise Buildings Designed and Constructed in Timber" (HiTimber) project aims to fulfill the future demands in higher education including innovation, sustainability, international, transdisciplinary and entrepreneurial approaches for the development of a new study module/elective element in sustainable high-rise timber buildings. Professionals state that the age of high-rise timber buildings has started. They agree that timber is an ideal material when grown in sustainable managed forests. It is being used more and more extensively in the building and construction industry. However, education in high-rise timber construction is still very limited, especially in Europe. Most HiEls in the EU, that have technical degrees in design, construction and materials for high-rise buildings have curricular implementing the studies of concrete and steel, being prefabricated or manufactured on site. Normally education in construction from timber focuses on 1 to 2 storey timber buildings. However, architects and engineering companies already working on high-rise timber buildings of up to 16 stories high. Thus, there is an urgent need to educate students with innovative applied skills needed in this area at the undergraduate degree level.

Figure 1. 'Brocks Commons' Vancouver, Canada. 18 Story Building (Acton Ostry Architects Inc. & University of British Columbia).

The specific objectives of the project are:

- To strategically research at which level sustainable design, construction and management of sustainable high-rise timber buildings are to be planned and implemented in the partner countries.
- To educate all participants (students, teachers, entrepreneurs) in the field of the sustainability and the emerging global problems.
- To develop and implement the new strategic trans-disciplinary module/elective element, which meets the needs of the HEIs and market representatives, fulfills the future challenges of sustainable design and construction of high-rise timber buildings.
- To improve competencies of students and teachers in problem solving and team work, innovative thinking, motivation, awareness of cross-professional project input and project management by using project-based learning approach.
- To ensure open awareness of the project results to local, national, EU level and international target groups.

The strategic partners have the competences and the motivation to develop higher education as trans-national cooperation involving industrial partners. Each HEI have their own fields of expertise in sustainability, teaching methodology, design, construction and management. The HiTimber project is innovative and fulfills a great need for solving the sustainability issues and creating sustainable solutions for the construction and related sectors for the future challenges. It will promote sustainable, environmental friendly design and construction of high-rise timber buildings. The project will complement to traditional higher education, but will use the innovative teaching/learning approaches, including trans-disciplinary, project-based learning, learning by doing, problem solving and critical thinking. Through strategic cooperation among the EU HEIs and stakeholders, the HiTimber project will develop new teaching practices to improve the education for the labor market needs. The proposed project will allow innovative know-how to be matured inside the companies, carried out and tested in real life conditions.

The project will be completed in three years as follows:

- A kick-off meeting will be organized to officially start the project and will gather the key participants involved in HiTimber project. Consortium agreement will be signed (Month 1st). Communication infrastructure to connect the project partners and the key actors outside the consortium will be developed; project website and partner websites will be created (Month 3rd). Further on-line and 3 face-to face three days' transnational coordination meetings (Month 5th, Month 17th, Month 35th) are planned to review project progress and to coordinate future activities.
- International study on best practices and knowledge gaps for sustainable construction of high-rise timber buildings will be prepared (O1, Month 5th). It will analyze and summarize the best practices on sustainable design, construction and management of high-rise timber buildings in countries of participants as well as

HiTimber

Project Reference

2017-1-DK-01-KA203-034242

Leading Institution

VIA University College (Denamark)

Partners

IST-ID – Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento (Portugal), Solent University (United Kingdom), TTK University of Applied Sciences (Estonia), VILNIUS TECH – Vilnius Gediminas Technical University (Lithuania), Study and Consulting Center (Estonia), Estonian Woodhouse Association (Estonia)

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CERIS Research Team

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Erasmus+ Programme of the European Union

Period

2017-2020

Total

396 111.00€

CERIS

63 480.00€

Project Website

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worldwide. Study will help to assess current capacities of education among EU HEIs, will provide detail understanding of the gaps and stakeholders' needs.

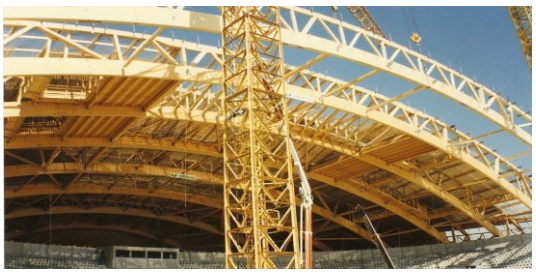

Figure 2. Construction of Atlantic Pavilion May 1997 (Courtesy of Instituto Superior Técnico).

- Findings of the study will serve as the basis for common BSc/BA study module "Sustainable HighRise buildings designed and constructed in timber" development (9 ECTS). The framework report for the common curriculum and the report on common grounds for teaching and learning will be prepared (Month 5th). Intensive training to improve teachers' competences will be organized in Denmark (C1, Month 5th), 15 teachers will be trained. Reports and competence improvement will help to develop the common trans-disciplinary module specification. It will include intended learning outcomes, assessment criteria, subject content; identification and development of teaching (learning) resources (handbooks, lecture plans); preparation of delivery and dissemination strategy; development of a feedback system for continuous module content update with the engagement of the external social partners, as well as students and academia to maintain the concept of lifelong learning and postproject sustainability (Month 7th).
- Intensive teaching courses for the students will be organized. For pilot course five international groups of architects, civil engineers, construction managers, architectural technologists and real estate management students (each group will consist of 6 students from different HEI) together will form multidisciplinary group and learn the new course by PBL and "learning by doing" approaches (C2, Month 8th). For this purpose, assignment books will be prepared (Month 7th, O4). Feedback from students, teachers and stakeholders will support module improvement and two more intensive teaching courses (C3, Month 20th and C4, Month 34th) in frames of the project will be organized.
- Intellectual outputs O1 and O2 as well as pilot training of students (C2) will form the basis for the joint book publication (O3, Month 19th). Volume of the book will be at least 300 pages and it will be divided into three major chapters: 1) Design of sustainable high-rise timber buildings; 2) Construction of sustainable high-rise timber buildings; 3) Management of sustainable high-rise timber buildings. The book will contain state-of-the-art reviews, case studies, practical solutions, tips for high-rise timber buildings design, construction and management and will be open source.
- The systematic monitoring, evaluation and performance improvement of all the project's processes, events and outputs, including: quality planning (quality plan will be developed (Month 2nd), internal and external monitoring and evaluation throughout the project will be ensured (A2). Interim (Month 17th) and final (Month 35th) monitoring reports will be produced. The results of the HiTimber project will be analyzed and assessed by the participants directly involved in project activities as well as external parties; systematic and general evaluation and impact assessment, feedback of the students, teachers, and non-academic parties foreseen. Final assessment report will be delivered (Month 35th).
- Variety of activities will be undertaken in order to disseminate project results and to ensure their sustainability (A3): international and local multilingual websites, printed dissemination materials, newsletters, publications and reporting through associations, national workshops, social networks (Facebook, LinkedIn), open education platforms (EPALE, Open Education Europa), research platform Research Gate, etc. Moreover, five academic publications will be published, out of these at least two - in highly ranked scientific journals (ISI WOS, with impact factor) (O5, Month 36th).