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Scientific Problems of Engineering Economics of Construction and Real Estate Management, Regional and Territorial Development ICEREE'2021

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BOOK OF ABSTRACTS

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FOREWORD	7
CHANGING PARADIGM IN CONSTRUCTION INDUSTRY – HYBRID ENGINEERED TIMBER BUILDINGS	8
CIRCULAR ECONOMY IN WOODEN CONSTRUCTION	9
RESEARCH-BASED LEARNING – THEORETICAL FRAMEWORK, ADVANTAGES AND DISADVANTAGES	10
PROJECT BASED LEARNING AS A TEACHING AND LEARNING METHOD IN HIGHER EDUCATION	11
INFLUENCE OF REMOTE WORK ON HOUSING PREFERENCES	12
THE ROLE OF GASEOUS FUELS IN A WAY TO THE EU CARBON NEUTRALITY	13
LAND USE DEVELOPMENT PREDICTION OF THE CITY OF RIGA (LATVIA) WITH LAND CHANGE MODELER (LCM)	14
ENERGY EFFICIENCY OF BUILDINGS IN THE EUROPEAN UNION AND LATVIA	15
THE ROLE OF RENEWABLE ENERGY RESOURCES IN THE EUROPEAN UNION AND LATVIA	16
SUSTAINABLE DEVELOPMENT THROUGH CIRCULAR ECONOMY PRACTICES	17
DEVELOPMENT STRATEGY OF SUSTAINABLE URBAN ENVIRONMENT IN JELGAVA CITY	18
THE ROLE OF SYNERGY IN SUSTAINABLE DEVELOPMENT OF MUNICIPALITIES IN NORTHERN EUROPE	19
LOCAL ENVIRONMENTAL POLICY FOR SUSTAINABLE DEVELOPMENT OF URBAN ENVIRONMENT	20
SUSTAINABLE URBAN ENVIRONMENT AND THE CONCEPT OF WASTE MANAGEMENT IN LATVIA	22
WASTE MANAGEMENT IN A SUSTAINABLE URBAN ENVIRONMENT IN LATVIA AND THE EUROPEAN UNION	24
OWNERSHIP OF ARCHAEOLOGICAL HERITAGE OBJECTS: CHALLENGES AND OPPORTUNITIES	25
THE REAL ESTATE INDUSTRY IN BALTIC REGION: POST-PANDEMIC CHALLENGES AND FUTURE PERSPECTIVES	26
THE IMPACT OF AN ENGINEERING CONSULTANT AND FIDIC ON RISK REDUCTION IN THE CONSTRUCTION INDUSTRY	27
THE EXIGENCY FOR A SYSTEMIC APPROACH TO GLOBAL GOVERNANCE: REDUCING THREATS AND INCREASING OPPORTUNITIES	28
LABOR COSTS IN THE BALTIC STATES AND THE NECESSITY TO INCREASE COMPETITIVENESS IN THE EU SOCIO-ECONOMIC AREA	30
COVID-19 POST-EFFECT ANALYSIS OF THE INDIAN REAL ESTATE INDUSTRY	32
RESIDENTIAL HOUSE MANAGEMENT AND MAINTENANCE SYSTEMS IN LATVIA	33
LIFE CYCLE OF MULTI-APARTMENT RESIDENTIAL BUILDINGS IN LATVIA	34
ASSESSMENT OF THE TECHNICAL CONDITION OF RESIDENTIAL HOUSES AND POSSIBILITIES FOR ENSURING THEIR FURTHER TECHNICAL SAFETY IN JEKABPILS	35

Content

MULTI-APARTMENT RESIDENTIAL HOUSE SAVINGS FUND AND ITS USE FOR BUILDING MAINTENANCE IN LIVANI	36
CHANGES IN AGGREGATE SUPPLY AND DEMAND AND DEVELOPMENT OF THE REAL ESTATE MARKET	37
EVALUATION PROBLEMS AND SOLUTIONS OF INVESTMENT PROJECTS IN CONSTRUCTION COMPANY	38
DIGITALISATION OF THE REAL ESTATE INDUSTRY AND POSSIBLE BUSINESS MODEL	39
MULTI-STOREY APARTMENT BUILDING MANAGEMENT FEATURES, PROBLEMS AND SOLUTIONS IN LATVIA	40
SAMPLE SELECTION CRITERIA FOR THE VALIDATION OF COMPLIANCE COST ASSESSMENT METHODOLOGY IN THE BANKING MARKET	41



FOREWORD	43
COMPARISON OF HOUSING MANAGEMENT QUALIFICATION SYSTEMS IN GERMANY, POLAND AND LATVIA	47
PROFESSIONAL QUALIFICATION OF HOUSING MANAGERS IN LATVIA WITH REGARD TO CLIMATE CHANGE MITIGATION	48
BUILDING-UP SKILLS OF REAL ESTATE MANAGERS IN POLAND IN VIEW OF EUROPEAN GREEN DEAL	50
WHY DOES THE FUTURE OF THE EUROPEAN UNION CLIMATE GOALS DEPEND ON HOUSING MANAGERS?	51
HOUSING POLICY IN LATVIA	52
MULTI-APARTMENT RESIDENTIAL HOUSE MANAGEMENT SYSTEM AND ITS INFLUENCING FACTORS	53
IMPORTANCE OF MAINTENANCE PHASE IN MULTI-APARTMENT RESIDENTIAL BUILDINGS	55
RENOVATION OF MULTI-APARTMENT BUILDINGS WITHOUT SUPPORT OF THE EU STRUCTURAL FUNDS	56



Foreword

Within the framework of the annual 62nd International Scientific Conference of Riga Technical University (RTU), the Institute of Civil Engineering and Real Estate Economics (ICEREE) of RTU Faculty of Engineering Economics and Management organizes conference "Scientific Problems of Engineering Economics of Construction and Real Estate Management, Regional and Territorial Development". Conference provides a discussion platform for researchers, where everyone can get to know the latest developments, research findings, ideas and their application in construction science and engineering economics, entrepreneurship and economics. The conference brings together scientists, researchers and PhD students from all over the world every year.

The goal of RTU 62nd International Scientific Conference Section "Scientific Problems of Engineering Economics of Construction, Real Estate Management, Regional and Territorial Development" is to promote scientific discussion on topical issues of construction management, real estate, regional and territorial development, as well as to publish the latest research results in the field.

Book of Abstracts is divided into 2 parts. First part contains 30 abstracts which are related to following thematic fields of the Conference: 1) Problems and tendencies of construction management and real estate engineering economics at the local and global level; and 2) Local and global development tendencies and scientific problems of regional and territorial development. Second part contains 8 abstracts which are related to International workshop "From Housing Manager to Climate Manager", which is organized within the framework of European Climate Initiative (EUKI) project "From Housing Manager to CLImate MAnager" (CLI-MA). Agreement number: 81263938. Project processing number: 17.9045.0-002.77.

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CHANGING PARADIGM IN CONSTRUCTION INDUSTRY – HYBRID ENGINEERED TIMBER BUILDINGS

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Abstract. At the moment global society is witnessing environmental crisis which is accelerating due to climate change. Urgent actions need to be taken to reach the sustainability target for 2050 of the European Commission for reduction of greenhouse gas emissions and net zero carbon dioxide (CO₂) emissions. The majority of today's buildings are designed and constructed in concrete and steel, producing large amounts of greenhouse gases. The concept of sustainable construction, which maximizes the use of timber materials, should be promoted. Use of engineered wood combines a potential for prefabrication and rapid construction with lower embodied energy and potential delay of carbon emissions during the building's lifetime. Sustainable hybrid timber buildings will require some amount of steel and concrete construction materials to satisfy structural, fire prevention, moisture absorption and economic requirements. It is assumed that hybrid timber buildings will be the buildings of the future. However, now EU higher education mostly focuses on design and construction of buildings in steel and concrete. Therefore, there is necessity to prepare students with innovative applied skills in the area of design, construction and management of hybrid timber buildings. Institute of the Civil Engineering and Real Estate Economics of the Riga Technical University is participating in EU Erasmus+ project "Design and Construction of Environmental High Performance Hybrid Engineered Timber Buildings" (HybridTim). Project is aimed at fulfilling the future demands in higher education of students in design and construction of high environmental performance hybrid engineered timber buildings by trans-disciplinary innovative student-centered learning approaches.

Keywords: carbon dioxide, climate change, greenhouse gas emissions, higher education, hybrid timber buildings, sustainability, sustainable construction, timber

JEL Classification: I21, L74, N64

Acknowledgement. This work was supported by the EU Erasmus+ project "Design and Construction of Environmental High Performance Hybrid Engineered Timber Buildings" (HybridTim). Project No: KA203-ACD02B26. Project code: 2020-1-DK01-KA203-075045.

CIRCULAR ECONOMY IN WOODEN CONSTRUCTION

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Abstract. With acceleration of climate change and other environmental issues global society is seeking for new and sustainable paradigm on how to operate. Urgent actions are required in all sectors of national economies. Circular economy is a prominent action to tackle climate change and the need for sustainable development. It operates beyond waste management and contains such elements as consumption, closed loops, design, business models, value preservation, sharing, renewable energy, industrial symbiosis and others. As the construction industry is responsible for a significant amount of global greenhouse gas emissions, principles of circular economy should be applied considering building's lifecycle from growth and extraction of materials, production, continuing with design, construction, building maintenance, and ending with building demolition and recycling of waste. As wood is the only significant renewable construction material, wood can also contribute to a more circular construction sector. Even though there is a significant set of literature emphasizing the drivers and benefits of circular economy, there is insufficient research done within a wooden construction context. Challenges of circular economy in wooden construction require scientific research and welleducated graduates, who are able to think holistically and interdisciplinary, to research, assess and model sustainable construction solutions. EU Erasmus+ project "Circular Economy in Wooden Construction" (WOOD in CIRCLE) is aimed at delivering innovative student-centred transdisciplinary education in circular economy-based wooden construction for postgraduate students across the European countries.

Keywords: circular economy, climate change, education, greenhouse gas emissions, sustainability, sustainable construction, sustainable development, wood, wooden construction

JEL Classification: I21, L74, O13, Q51

Acknowledgement. This work was supported by the EU Erasmus+ project "Circular Economy in Wooden Construction" (WOOD in CIRCLE). Project No: KA203-8443DA0D. Project code: 2020-1-LT01-KA203-077939.

RESEARCH-BASED LEARNING – THEORETICAL FRAMEWORK, ADVANTAGES AND DISADVANTAGES

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Abstract. Research-Based Learning (RBL) is a concept of integrating research results and activities into learning strategy and it has been used to develop students' skills in research. The authors used literature review to explore theoretical framework, advantages and disadvantages of RBL. Results show that there are three stages of RBL: exposure stage, experience stage and capstone stage. Authors identified 4 implementation approaches of RBL - research-oriented (RO), research-based (RB), research-tutored (RT), research-led (RL) - and each one of them has slightly different student involvement. RBL facilitates the development of students' cognitive activities by stimulating creativity, critical analysis, logic, flexibility, risk management, research skills, problem solving, initiative, mental conflict, resolution, summation and conclusion development skills. The main disadvantage could be represented by an incorrect guide of the student in RBL. Therefore, applying RBL as a learning strategy requires professional teacher who guides students' activities. Finally, it may be concluded that RBL defines an approach in which teachers encourage students to be researchers, discoverers and creators of their own and others learning, within a lesson or series of lessons, which includes a learning aim or objective.

Keywords: cognitive activities, lesson, literature review, research, Research-Based Learning, student, teacher

JEL Classification: I21

Acknowledgement. This work was supported by the EU Erasmus+ project "Circular Economy in Wooden Construction" (WOOD in CIRCLE). Project No: KA203-8443DA0D. Project code: 2020-1-LT01-KA203-077939.

PROJECT BASED LEARNING AS A TEACHING AND LEARNING METHOD IN HIGHER EDUCATION

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Abstract. Traditional academic methods for studying are well researched and effective for general studies. For studies of applied sciences, there is a need to provide specific knowledge for the time and learning efficiency. One of innovative methods is Project Based Learning (PBL). This method enables provision of intensive training to assure insights of specific technical aspects or methods. PBL can be applied to assure deep understanding of a topic and working for an extended period of time to investigate and respond to an authentic, engaging and complex question, problem or challenge. Authors used literature overview to reflect PBL theoretical framework. Benefits include such crucial aspects as interdisciplinary tasks, student-centred learning, real life problems and group work. Using PBL, tasks can be scaled to align learning objectives with student skills and time frame, like technical design of hybrid engineered timber buildings. Research results show that use of PBL helps to increase motivation and involve students into the profession. Method provides elasticity to respond to current needs for analysis and demands. PBL is also an active learning method as solutions might differ from group to group for the same task. Method can be applied to seek for conceptual solutions for the use of perspective technologies, like aiming to reduce concrete use ratio in building. Applying PBL, tasks can be aimed to design construction elements of renewable resources as timber or timber products, like cross laminated timber (CLT), while maintaining needed construction parameters and promoting transition to more sustainable construction practices.

Keywords: carbon footprint, cross laminated timber, hybrid engineered timber buildings, learning methods, Project Based Learning, sustainable buildings

JEL Classification: I21, I23, L73, L74, O33, Q51, Q56

Acknowledgement. This work was supported by the EU Erasmus+ project "Design and Construction of Environmental High Performance Hybrid Engineered Timber Buildings" (HybridTim). Project No: KA203-ACD02B26. Project code: 2020-1-DK01-KA203-075045.

INFLUENCE OF REMOTE WORK ON HOUSING PREFERENCES

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Abstract. The outbreak of Covid-19 at the beginning of 2020 shocked the whole world. It influenced all the sectors of national economies and eroded the years of progress towards achieving United Nation's Sustainable Development Goals. As many countries went into lockdowns, operations of industries were limited. A lot employers were forced to switch their operations from office-centric work to remote work, and the requirement to live near the workplace for employees lost its significance. More than 1 year after the beginning of Covid-19 outbreak practices of work have not switched back to the pre-pandemic mode - a lot of employers still allow their employees to work remotely and it seems to be the "new normal". The attractiveness of urban areas as a place for living is often determined by employment opportunities, but this attraction is taken away by remote work as employees are able to work from any place. Authors using literature review have discovered that housing affordability, taxes, real estate value, crime rates, proximity to family and friends, neighbourhood's ecological parameters and education system are the main factors that influence housing preferences. As approximations about the end of Covid-19 pandemic are uncertain, nations could experience major shift in internal migration from urban areas to countryside as counterurbanization takes place. This shift could potentially reduce the gap in real estate values between cities and rural areas leading to overall socioeconomic and environmental benefits and promoting regional development.

Keywords: counterurbanization, Covid-19 pandemic, environmental benefits, housing preferences, literature review, office-centric work, remote work, sustainable development, Sustainable Development Goals

JEL Classification: 018, Q01, R21, R31

THE ROLE OF GASEOUS FUELS IN A WAY TO THE EU CARBON NEUTRALITY

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Abstract. The gaseous fuels are one of the key elements in decarbonization of the national economies of roughly all the European Union (EU) Member States. At the moment, the most prominent gaseous fuel in the EU is the natural gas, which, both in liquid and gaseous states, reaches its market via rather diverse routes (supply chains). Moreover, the EU's energy sector dependence from the natural gas is quite significant, as, in 2020, the EU Member States imported 322 billion cubic meters (about 3145.76 terawatt-hours) of this fuel, which came from more than 10 locations worldwide.

The natural gas, quite frequently also referred to as "conventional methane", is important source of electricity and heat energy in the central and northern parts of the EU, which is used intensively throughout consumer groups – starting with the largest industrial consumers (such as heavy industry, steel production, chemical production etc.), energy generation utilities and ending with the smallest – households. However, being one of so called "conventional" or "fossil" fuels, the natural gas, despite its sustainability and wide potential of effective use, in the nearest future most likely is about to lose its role in the EU energy sector.

According to decarbonization agenda, the natural gas is about to bridge the transition from current carbon intensive economy to the carbon neutral one in mid-21th century by blending with wide range of renewable gases (RG): biogas, biomethane (biogas upgraded to biomethane level), "green" hydrogen (produced during conversion of electricity from RES into hydrogen, via electrolysis) and synthetic natural gas. During the blending, RGs are expected to gradually replace the natural gas in the EU energy consumption, thus ensuring the gaseous fuel diversification throughout consumption range.

However, this process is rather challenging not only from the theoretical and scientific, but also practical standpoint, and brings forward several risk factors, which must be identified, evaluated, analyzed and – which is most important – sustainably managed. These factors include but are not limited to political, socio-economic and engineering risks, which must be adequately addressed to make the EU energy transition in the gas sector as smooth, well regulated, well balanced and safe as possible.

Key words: decarbonization, gaseous fuels, natural gas, renewable gases, risk factors

JEL Classification: G28, K32, L91, L94, L95, L98

LAND USE DEVELOPMENT PREDICTION OF THE CITY OF RIGA (LATVIA) WITH LAND CHANGE MODELER (LCM)

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Abstract. Riga being the capital of Latvia is one of industrial, business, cultural, sports and financial centres in the Baltic States, as well as an important port city. Considering that the area of Riga is 307,2 km² and it is the most populated city in Latvia, it is important to balance socio-economic and environmental interests. As the urbanization processes are ongoing and the significance of Riga in national and international contexts is growing, it is crucial to analyse land use development as the area of Riga is limited. Paper is aimed at predicting land use development of Riga (Latvia) for incoming years considering the development tendencies in time period from 1996 to 2021. Landsat data have been used to simplify a representation of a dynamic model according to Land Change Modeler (LCM). The model performs Markov chain process to determine the expected quantity for land allocation scenario at the specified date. IDRISI Terrset and ENVI software's have been used for this purpose and changes reflected that the forest land cover from 1996 to 2021 has increased by about 3,85% (74,2 thousand ha). Similarly, the planted area shows 11.21% (59.6 thousand ha) growth that can be related to implementation of the agriculture fundamental reform by the Ministry of Agriculture in 2003. Additionally, the settlement area shows 4,84% (30,4 thousand ha) growth during the aforementioned period. According to this data the forecasting model has been applied to predict the upcoming years. The models show the consistency of forest area expansion that leads to above-ground biomass increase by about 0,1% m³×ha⁻¹ for the city of Riga.

Keywords: Land Change Modeler (LCM), Land Forecasting, Land Use Inventory, Land Use Mapping, Markov Chain Model, Remote Sensing Landsat

JEL Classification: R14, R52

ENERGY EFFICIENCY OF BUILDINGS IN THE EUROPEAN UNION AND LATVIA

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Abstract. Everyone on the planet Earth has a responsibility to make the planet more sustainable. Considering the global dominance of fossil fuels, which pollute the atmosphere with greenhouse gas emissions, there is an urgent need to reduce their use in order to prevent serious climate change. Accordingly, reducing energy consumption also plays a key role in tackling the negative effects of global climate change. Reducing energy consumption is important, because fossil fuels account for the majority of the world's energy use and it will take decades to fully switch to renewable energy sources. With each year of inaction, the remaining carbon budget shrinks. In order to reduce the ever-increasing energy consumption, it is necessary to increase the efficiency of all energy-using appliances and to ensure the rational use of energy. In the European Union, the building sector is one of the largest consumers of energy and one of the largest sources of CO₂ emissions. Consequently, in order to achieve energy and climate goals, the European Union must improve the energy efficiency of buildings. In Latvia the building sector represents approximately 40% of the total energy balance. Considering average energy consumption for heating, buildings have significantly lower thermal properties than can be provided by currently available technologies. For the 2021-2030 planning period, newly built buildings in Latvia must correspond to nearzero energy buildings. Progressive energy efficiency requirements for buildings in Latvia help to move towards the country's overall energy savings target in the planning period until 2030 and facilitate the transition to a low level heat consumption. In order to achieve its energy and climate goals, the European Union must provide greater financial support to the member states contributing to energy efficiency improvements of buildings.

Keywords: buildings, climate change, energy efficiency, energy consumption, greenhouse gas emissions, sustainability, sustainable development

JEL Classification: 013, Q01, Q40, Q48, R11

THE ROLE OF RENEWABLE ENERGY RESOURCES IN THE EUROPEAN UNION AND LATVIA

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Abstract. The transition from timber to coal, oil and natural gas was very important for the development of today's economy. The next transition from fossil fuels to renewable energy will be crucial to avoid catastrophic climate change. The implementation of renewable energy projects has a potential to create millions of jobs worldwide. Renewable energy offers our planet the opportunity to reduce carbon emissions, to purify the air and to make our civilization more sustainable. Renewable energy is an essential element within the general strategy of sustainable development. Renewable energy sources help to reduce dependence on energy imports, thus ensuring a sustainable energy supply and climate protection. In addition, renewable energy sources can help to improve the competitiveness of sectors in the long term and have a positive impact on regional development and employment. Directive 2018/2001 sets a common binding target for the Member States of the European Union to achieve a 32% share of renewable energy in the European Union's final energy consumption by 2030. Latvia has planned its contribution to the achievement of the common goal of the European Union mainly by supporting the use of wind energy, solar energy, biomass and biogas, thus achieving a 50% share of renewable energy resources in final energy consumption. In order to achieve this goal, the share of renewable energy resources must be increased in all sectors: 1) electricity; 2) central heating; 3) local and individual heat supply; and 4) transport. In order to achieve the goal set by European Union, the governments of the member states of the European Union need to accelerate the use of the tools and programs to increase the share of renewable energy in national energy balances, thus reducing greenhouse gas emissions per unit of energy, as well as to provide more support to R&D institutions engaged in research and development of technological solutions of renewable energy to increase the amount of energy produced per 1 m².

Keywords: climate change, energy production, fossil fuel, greenhouse gas emissions, non-renewable energy, renewable energy, sustainability, sustainable development

JEL Classification: 013, Q01, Q42, Q48, R11

SUSTAINABLE DEVELOPMENT THROUGH CIRCULAR ECONOMY PRACTICES

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Abstract. In the past three decades, the concept of sustainable development became the focus of attention in practically all the developed and developing countries. This concept aims at achieving a balance between various economic, ecological, and social aspects, that form the key pillars of sustainability. We aim to summarize and systematize contemporary theoretical and methodological approaches to sustainable development. The methodological base for this study is presented in concepts of "green economy" and circular economy. The methods employed are analysis, synthesis, and classification of various literature sources. The analysis resulted in proof of the significance of the sustainable development goals in the management of general modernization processes in both the society and the economy of the country. The authors analyse the theoretical and practical foundations of the circular economy as a relatively new trend of sustainable development. The results of this study can be used for further research in this field as well as perform as a foundation of achieving sustainable development on different levels of management through circular business models, recycled raw materials market, and management of circular production and consumption.

Keywords: circular economy, green economy, sustainability, sustainable development

JEL Classification: Q50, Q56

DEVELOPMENT STRATEGY OF SUSTAINABLE URBAN ENVIRONMENT IN JELGAVA CITY

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Abstract. Nowadays cities and society have become close elements that interact with each other and depend on each other on a daily basis. The current trend for people is to prefer living in cities to be closer to the institutions and the services they need on a daily basis. In this way, global challenges such as overcrowding and urbanization are increasing importance in global context. In addition, as the number of people around the world is growing, more resources are being spent to meet daily needs. Greater emphasis is being placed on saving resources, as their amount is limited and some sectors are already facing resource scarcity. Considering the above-mentioned problems of urbanization, population growth, rural depopulation and resource scarcity, modern society has severely damaged the planet's ecological state, contributing to massive air and water pollution, which urgently needs to be improved to ensure sustainable development. All these problems inevitably affect everyday life and health of society. Therefore, it is necessary to constantly study the various ecological problems, look for interconnectedness among them and develop solutions to reduce them. Jelgava is one of the smart cities in Latvia, which could serve as an example for sustainable urban development.

Keywords: development strategy, sustainability, sustainable development, urban environment

THE ROLE OF SYNERGY IN SUSTAINABLE DEVELOPMENT OF MUNICIPALITIES IN NORTHERN EUROPE

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Abstract. Development is one of the basic principles of humanity and one of the basic elements for building a better future. Sustainable development is based on meeting the existing needs of humankind without compromising this opportunity for future generations to meet their needs. Since humanity shifted its focus from surviving to prosperity, this ideology has become the foundation of many industries around the world including urban planning and the urban economy. Sustainable development is based on three pillars: environmental, economic and social. The environmental dimension aims to reduce the negative impact of extraction of natural resources, energy production and consumption. At present, sustainable urban policies in the Northern Europe lead to synergy effects among environmental, economic and social dimensions. The research describes the theoretical framework of the concept of sustainable development, as well as analyses global sustainability policies. The obtained results form an idea of the current situation in relation to sustainability policies in Latvian municipalities. Based on the performed analysis, the authors identified the main criteria for the development of a sustainable energy action plan of the municipalities in Northern Europe.

Keywords: environment, municipality, sustainability, sustainable development, synergy, urban areas

JEL Classification: Q01, Q43, Q50, R10

LOCAL ENVIRONMENTAL POLICY FOR SUSTAINABLE DEVELOPMENT OF URBAN ENVIRONMENT

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Abstract. Development and its sustainability are the main elements helping to build a better future by satisfying humans' present needs and considering future needs of future generations. Sustainable development is based on three main pillars - environmental, economic and social. Environmental dimension focuses on decreasing negative impacts of using natural resources and energy while providing the necessary to satisfy a society's needs and is considered as one of the basic elements of sustainable development policy. Effective, successful and sustainable development must cover every governance level starting from local to global. Planning processes of local municipality assist significantly by providing necessary information and education in terms of sustainable development. The Climate Action Plan of United Nations stresses on the importance of local municipalities and their involvement in sustainable development of urban environment. Current research is aimed at analyzing Sustainable Energy Plan and Climate Action Plan in urban environment of Latvia and developing and approbating the local sustainable environmental policy improvement matrix. The analysis of energy action and climate action plans developed by five municipalities of Latvia has helped to identify the main criteria for the local government plan of urban environment and sustainable energy. Therefore, the authors of the research have established eight categories of criteria: institutional dimension; structure of the plan; description of the current state of the energy sector in a region; quality of the input data of the emission calculation; adaptation of the energy sector to climate change; targets set; measures set and monitoring. Altogether it includes 71 criteria. The aim of the plan is to find better ways and tools to improve local environmental policy in urban environment as well as in Latvia, thus reaching the 2030 goal of the EU to decrease greenhouse gas emissions by 55% compared to 1990. Taking into account the identified criteria, a sustainable environmental policy assessment tool was developed, which can be used to assess the energy action plans developed by a municipality. The study performed verification and validation of the developed tool, using it for the evaluation of nine Latvian municipalities. Municipalities have a wide range of tools at their disposal for the implementation of local sustainable development policy, from development planning documents and action plans to

direct investments in infrastructure improvement. However, many municipalities face barriers to apply these tools, such as lack of knowledge, motivation and/or capacity.

Key words: energy, environmental policy, local government, sustainable development, urban environment

JEL codes: Q01, Q40, Q50, R10

SUSTAINABLE URBAN ENVIRONMENT AND THE CONCEPT OF WASTE MANAGEMENT IN LATVIA

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Abstract. According to the European Commission's study Latvia is far behind the targets set in the field of waste management. Therefore, everyone involved in the waste management system must participate and help to improve the situation consumers, producers, local authorities, waste management companies and policy makers. Waste management is a complex socioeconomic process governed by more than 40 different laws in Latvia, which means that the regulatory framework is fragmented and performed at certain levels. Changes in the amount of municipal waste generated in Latvia are directly dependent on the country's economic activity or changes in GDP value, as demonstrated by a strong correlation between the two indicators (0.96). The authors of the research evaluate the implementation procedure of the Latvian waste management system and its legal framework, as well as analyse the National Waste Management Plan 2021-2028, thus identifying all the possible present and future problems in waste management. Although the waste recycling rates are low and since 2015 the annual reporting in the amount of waste disposed in landfills has occurred in Latvia, the latest data show that Latvia will not achieve the 50% recycling level set out in the EU Directive in 2020, which may mean a fine for failing to achieve the target. Despite the fact that biodegradable waste accounts for 49% of the total amount of municipal waste generated by Latvian residents, there is no adequate infrastructure in the country for separate collection and efficient recycling or recovery of such waste, obtaining energy or by-products to be reused in the economy. After analysing the data, the authors developed a concept of waste management which could help to promote sustainable urban environment. The municipality of Riga city is subject of the research. The concept of waste management has been developed, based on the basic principles of sustainability and addressing the growing problem of biodegradable waste with an aim to promote the transition of the municipal waste management system to a recycling model that would achieve the European Union's waste policy goals by 2025. It is society's duty and responsibility to protect the

environment, considering sustainable waste management. To achieve this, active collaboration among various stakeholders needs to take place.

Keywords: environmental protection, municipality, sustainable urban environment, waste management, waste

JEL codes: 018, 021, Q01, Q53, Q57, R10

WASTE MANAGEMENT IN A SUSTAINABLE URBAN ENVIRONMENT IN LATVIA AND THE EUROPEAN UNION

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Abstract. Waste is being generated continuously. Every household, company, factory, part of society and country produces certain amount of waste. thus arising several issues - what should be done to reduce the generated waste, what to do with the generated waste, how to recycle it and what is necessary to do that effectively. This leads to necessity of certain activities, procedures and systems to help reduce waste and promote environmentally friendly ways to manage waste as well as reduce harmful chemicals in daily life and nature. The research investigates reasons of waste generation, history and classification of it in the 21st century. Furthermore, waste management opportunities and importance are discussed in terms and context of sustainable economic development. In order to obtain a comprehensive overview of current issues in the waste management sector, the authors compile statistical data on waste generation trends in Latvia and the European Union from 2015 to 2020 including analysis of the interaction of various internal and external factors affecting it. Possible problems are identified by evaluating the implementation procedure of the Latvian waste management system and its legal framework, as well as analysing of National Waste Management Plan 2021-2028. Nowadays the circular economy plays an important role because it focuses on saving resources, reducing the environmental pollution and ensuring the reuse of products and materials. The circular economy is the opposite of traditional understanding of so-called "linear economy", which can be characterized as a "take-make-dispose" model. Unfortunately, transition to the circular economy is at its early application stage and does not provide expected effects to waste reduction and waste management in practice. This waste-free approach, which has already been chosen by more than 400 European cities, becomes more discussed.

Keywords: circular economy, environment, sustainable urban environment, waste, waste management

JEL codes: 018, Q01, Q53, R10

OWNERSHIP OF ARCHAEOLOGICAL HERITAGE OBJECTS: CHALLENGES AND OPPORTUNITIES

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Abstract. Archaeological sites as a part of cultural heritage provide opportunities to satisfy different interests, such as aesthetic, symbolic, educational, research and other. No less important are the economic opportunities offered by the development of the potential of these sites. Socio-economic opportunities provided by heritage sites, depending on the quality and significance thereof, affect many stakeholders – private and public owners, local community, researchers, visitors, businesses, mass media, heritage institutions, etc., as well as society as a whole. However, it is widely acknowledged that investment in cultural heritage (incl. archaeological) sites (e.g. conservation, restoration, maintenance, marketing, etc.) tends to outweigh their direct economic benefits (direct revenue). Archaeological sites in Latvia have the status of cultural monuments; however the aforementioned status not only increases socio-economic opportunities for the development of the site, but also imposes certain obligations and economic activity restrictions. Thus, questions arise: does the archaeological site represent opportunities or burden to its owner? What does the effective use of the archaeological object owner's opportunities depend on?

The presentation uses the integration of socio-economic and legal approaches to the researched issue. It provides both theoretical and practical insight into the problems of archaeological heritage objects development potential and possible solutions thereto. The presentation is based on the research conducted by A.Kairiss (PhD oec. cand., Mg. sc. soc., Bac. iur.) and I.Olevska (PhD iur. cand., LL.M., Diploma in Art Law) in 2020-2021.

Keywords: Archaeological heritage, Antiquities, Burden, Economic activity restrictions, Socio-economic opportunities

JEL Classification: Z10, Z18, K11, K25, K34, K42

THE REAL ESTATE INDUSTRY IN BALTIC REGION: POST-PANDEMIC CHALLENGES AND FUTURE PERSPECTIVES

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Abstract. The real estate investment remains one of the viable and profitable endeavours bringing very lucrative returns to its investors. Recent events like the Covid-19 pandemic have brought enormous drawbacks to the sector and its affiliated sectors like the construction industry and the construction supply chain. After the outbreak of Covid-19 pandemic all Baltic economies shrank. Nevertheless, numerous big transactions and even the arrival of new foreign companies occurred in the Baltic investment market. Despite the short-term uncertainties, there has been a steady increase in the long-term attraction of the real estate to investors bearing in mind the immediate and future challenges facing the sector. The nature of the sector and its interconnections with the construction and the construction supply chain sectors defines the nature of the challenges, making some of those challenges direct and others indirect. Main results of research reveal direct challenges of real estate industry in Baltic region: constrained liquidity; lack of alternative forms of financing that provides investors with appealing products; the impacts of e-commerce on the traditional retail space; insufficient investment capacities in environmentally friendly, energy efficient facilities; affordable housing; and the sectors' ability to adapt to the technological level. Among the indirect challenges faced by the industry are rising cost of materials, skilled labour shortages, poor project performance, which affects delivery times, sustainability and efficiency of energy demands within the construction sector.

Keywords: construction sector, e-commerce, energy demands, liquidity, pandemic, supply chain

THE IMPACT OF AN ENGINEERING CONSULTANT AND FIDIC ON RISK REDUCTION IN THE CONSTRUCTION INDUSTRY

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Abstract. The construction industry in Latvia is often faced with solving the difficulties of the construction process, already in the active stages of the construction process in terms of time and costs.

This indicates mistakes made in the early stages of construction. With the introduction of the institute of engineering consultants in the construction sector, it will be possible to more precisely define and separate the duties and responsibilities of the construction initiator from other participants in the construction process, reducing errors and problems from the very beginning. In addition to the Institute of Engineering Consultants, useful tools are the EN 16310 standard as well as FIDIC standard contracts.

Keywords: engineering consultant, standards, FIDIC, customer, builder, construction initiator, construction process, EN 16310

THE EXIGENCY FOR A SYSTEMIC APPROACH TO GLOBAL GOVERNANCE: REDUCING THREATS AND INCREASING OPPORTUNITIES

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Abstract. The results of the studies performed by many scientists demonstrate that the number of problems that cannot be solved in one country or continent of the world is constantly increasing. High level of environmental pollution, global warming and the spread of the pandemic are issues of concern to people on all continents of the world today. It would be scientifically correct and necessary to ask a number of questions: "Why is this happening? What is the cause of these phenomena and what measures should be taken to improve the situation?" Measures taken in the most developed countries of the world to increase the level of well-being of the population often reduce the opportunities to raise the standard of living in the least developed countries. Today, more than 800 million people do not have enough daily food, while more than 650 million are obese. The research results show that the cause of population starvation is more related to the inadequate management of food flows in the world. About one third of the world's food production ends up in waste, and a total of 2.3 billion tonnes of food production is not consumed worldwide. According to UN research, global food consumption will increase 1.7 times by 2050. At the same time, the consumption of natural renewable resources is increasing dramatically. Currently, 1.7 Earths are needed to meet the needs of the population, but by 2050, 3 Earths will be needed, maintaining the current order of consumption of resources. It means that the threat of injustice and inequality among the nations of the world can increase without changing the current world governance patterns.

Within the framework of the study, the world is perceived as the internal environment of the Earth, as a socio-ecological megasystem, in which the dominant element is social in the broadest sense of the word. In a narrower sense of the word, this megasystem is dominated by the governance element as a function of the social element. It means that the causes of global development problems are directly related to the mismatch between the form and content of global governance as a megasystem and the threats and opportunities faced by people on different continents and countries. Climate change, declining natural resource regeneration capacity, population growth, destructive attitudes towards consumption in developed countries and poor management of food flows are just some of the factors that call for fundamental reforms in our system of global governance. Sustainable development can turn into a utopian idea if no action is taken to reconstruct the global governance system and make it more responsive to global threats.

Keywords: system, world – socio-ecological megasystem, global governance system, global governance inconsistency, global threats

JEL Classification: E21, F62, F64, P10

LABOR COSTS IN THE BALTIC STATES AND THE NECESSITY TO INCREASE COMPETITIVENESS IN THE EU SOCIO-ECONOMIC AREA

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Abstract. The topicality of the study is related to the constant decrease of the economically active population in Latvia and other Baltic countries, as the labor force emigrates to the EU countries with a higher level of prosperity and greater opportunities to increase income. Therefore, the aim of the study is to evaluate the possibilities to reduce labor costs while increasing the wages of employees in various sectors of the economy in order to reduce the threat of labor emigration. To achieve the aim set, an appropriate methodology is applied, within which the necessary data are selected and as a result of their processing it is possible to identify opportunities to reduce labor costs, promoting the country's competitiveness both in the EU economic area and worldwide. Within the framework of the study, labor costs in the Baltic States are examined in the context of the Scandinavian countries, Ireland and Poland. Thus, a methodological basis is created to discover and analytically evaluate the possibilities to reduce labor costs in Latvia and other Baltic countries.

Wages make up the bulk of labor costs and there are significant differences among the Baltic States in this indicator. The lowest share of wages has been found in Estonia – 74%, but the highest – in Lithuania accounting to 96.7%. In this country, labor costs were restructured in 2018, but until then, wages made up 78 % of labor costs. As part of the restructuring process, the social tax in Lithuania was reduced more than 4 times – from 4.4 billion EUR to 760 million EUR. Thus, social tax payments to total labor costs decreased sharply – from less than 22% in 2018 to 3.4%, or more than 6 times, in 2019. In Estonia, in turn, social tax payments made up 26% of the total labor costs in 2020, in Latvia – 17.6%, and in Denmark – 8.2%, which was 2 times lower compared to Sweden and Finland. It means that the efforts of the Baltic States to reduce labor costs at the expense of social tax should be considered as a temporary but topical solution in the current situation.

The results of the study show that in order to reduce labor costs per unit of production, it is necessary to increase production efficiency – to increase the number of goods and services produced per unit of time. It means that entrepreneurs working in the Baltic States should pay more attention to the modernization of

technologies and raising the qualifications of the workforce. Moreover, these measures need to be reconciled with existing threats of labor migration.

Keywords: salary, labor force, labor costs, competitiveness, social tax

JEL Classification: E62, F16, J31, L26, M48

COVID-19 POST-EFFECT ANALYSIS OF THE INDIAN REAL ESTATE INDUSTRY

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Abstract. India is fortunate in that it has one of the world's fastest expanding real-estate markets, according to the World Economic forum. Non-Resident Indian (NRI) investments in India account for most of their total stake in the Indian housing market, which is not only drawing local real-estate developers, but also international investors. Despite the worldwide economic doom that has resulted from the sub-prime mortgage meltdown and subsequent credit constraint, India's housing industry is on track to post double-digit growth for yet another year. Indian Retail Sector Analysis, a large study, and other sources credit the fast urbanization and expansion to a huge population base, increasing income levels, and rapid urbanization, respectively. COVID 19 has had a significant effect on the Indian real estate market, although it has not totally disrupted it. Based on the current expansion shown by the Indian home building industry, it is anticipated that the sector would surpass other industrial sectors in terms of contribution to Gross Domestic Product (GDP) growth during the next few years, according to this viewpoint. The study utilizes a secondary data research approach and analyses the current trends and patterns in the Indian real estate market sector after the rollout of COVID 19.

Keywords: COVID-19, Indian real estate market, Real estate economy

JEL Classification: 019, 053, R11

RESIDENTIAL HOUSE MANAGEMENT AND MAINTENANCE SYSTEMS IN LATVIA

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Abstract. It is necessary to manage and maintain any real estate object, including an apartment house, in order to ensure its technical preservation in order to preserve and maintain the safety of its inhabitants.

Real estate management and administration, used in the sense of the terms, in Latvian legislation often overlap and can be considered synonymous. Also in the framework of this research, it is assumed that management and administration essentially refer to the same process, which aims to preserve and even improve the value of real estate – its technical condition, suitability for the function to be performed, compliance with regulations and good practice, which, of course, also affects the real estate market price.

The International Organization for Standardization defines facility management as "an organizational function that integrates people, places, and processes into the built environment with the goal of improving people's quality of life and core productivity".

The management of residential houses includes not only economic content, housing and their management is also of a social nature. Residential management was and will always be a topical issue as it affects the basic needs of the population.

ISO 41001: 2018 "Facility management – Management systems – Requirements with guidance for use" provides for the definition of responsibilities and the establishment of a management structure and resources appropriate to the needs of the organization. The main goal is to provide a system and criteria by which facility management teams can be assessed as "fit for purpose".

Consequently, it can be concluded that the management of an apartment house is a professional discipline that affects any organization, regardless of its size. As such, it has a significant impact on the efficiency of companies in a number of areas.

Housing management services, including utilities, are necessary and should be available to all levels of society. The price of building management and the cost of maintaining a residential house are the most important factors in choosing the form of object management and the form of appointing a manager.

Keywords: management system, facility management, housing management services, real estate management

JEL codes: L74, L85

LIFE CYCLE OF MULTI-APARTMENT RESIDENTIAL BUILDINGS IN LATVIA

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Abstract. Although the life cycle assessment of multi-apartment residential buildings has been used in the construction industry since 1990, there is not yet an internationally recognized methodology for the assessment and organization of life cycle inventory data for buildings.

Building life cycle assessment is particularly complex because buildings are more complex than most other products. The service life of buildings is long, which in turn makes it difficult to predict the entire life cycle of a building or structure. Buildings can also undergo changes throughout their life cycle, potentially leading to a significant structural difference between a building that is demolished at the end of its life and a building that was originally built. In addition, although most other products do not have a significant impact throughout the life cycle, the life cycle of buildings is often a major factor in the overall life cycle impact. Also, there are many stakeholders in the construction industry, including designers, builders and users.

Real estate managers, when performing the management process in a certain or specific multi-apartment residential house, should be guided by the following main principles: the aspect of possibilities of technological improvements; aspect of the operational activities to be performed; economic aspect and mutual communication aspect.

Knowing the life cycle of an apartment house, which can be tentatively expressed in years and divided into life cycle phases, and after dividing the technological processes into priority phases, the apartment house manager can strategically plan the management functions to be performed.

The life cycle of a multi-apartment residential house allows the building manager to develop a long-term plan for the use of financial resources, which in turn would generate possible additional income. Thus, it is permissible that a house savings fund will be established for a certain period of time, which will be able to be used when capital investments are needed to renovate the property.

In building life cycle assessment, the boundaries of the system for creating life cycle assessments differ significantly depending on which elements, life cycle phases and environmental loads are included. A common life cycle assessment system for buildings is needed to increase the comparability and relevance of case studies.

Keywords: assessment system, building life cycle, construction industry, real estate management

JEL codes: L74, L85

ASSESSMENT OF THE TECHNICAL CONDITION OF RESIDENTIAL HOUSES AND POSSIBILITIES FOR ENSURING THEIR FURTHER TECHNICAL SAFETY IN JEKABPILS

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Abstract. Any building and structure are like an organism that is like a human being – feels bad, sick and starts to age sooner or later, so prevention is needed in time to prolong the life of a building. A large part of the population lives in apartment buildings built between 1960 and 1990, when the construction of residential buildings was widely expanded at that time, using standard designs and prefabricated reinforced concrete panel structures.

Panels for building construction were produced at a very fast pace, not really following the technology to the fullest, but still the operating resources are equivalent to 35 to 40 years after their commissioning.

Latvia is located in the temperate climate zone, which is located in both the southern and northern hemispheres. There are four seasons in this climate zone, so there are four weather changes a year. This means that the Latvian climate is by no means the most suitable for ensuring the operation of buildings.

In order to maintain the building and ensure the longer service life of the building, any owner of the building must, in order to be safe, keep his property in a condition that does not endanger or harm neighbours, the surrounding residents or its occupants. Normative acts stipulate that the owners of a structure must ensure the maintenance of the structure and its elements during operation so as to comply with the essential requirements specified by the structure. According to the definition of the construction process in regulatory enactments, if the technical condition of a building is dangerous or damages the landscape, then the residents of this building are obliged to arrange the building through the real estate manager to the extent necessary for safe and comfortable operation.

Keywords: apartment buildings, service life of the building, management of real estate, technical condition of a building

JEL Classification: L8, L74

MULTI-APARTMENT RESIDENTIAL HOUSE SAVINGS FUND AND ITS USE FOR BUILDING MAINTENANCE IN LIVANI

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Abstract. Multi-apartment residential houses become obsolete over time, with them the utility payments increase, the need for various repairs arises, therefore it is important to create a provision for the maintenance of the building.

The maintenance of multi-apartment residential buildings is largely associated with significant financial resources. More and more people are paying attention to the safety of their homes, however, insufficient funds are not allocated for the timely maintenance of buildings. If financial and other resources are invested in a timely manner in the appropriate quality for the maintenance of any building, then in the long run the costs for residents, in this case apartment owners, will decrease to minimize accident losses as construction costs increase every year.

The owners and managers of the building and the supervisory institutions must fulfill the duties and responsibilities specified in regulatory enactments. In Livani, most or 86% of apartment buildings were built in the period from 1959 to 1989. By 1948, 8 houses or 8% were built, from 1948 to 1959 – 6 houses or 5%, after 1989 2 houses, which make up 1% of the total multi-apartment housing stock.

Houses up to five storeys with a roof floor have been built in the building area of Livani city center and will continue to be permitted in the future – in accordance with the conditions of the Livani municipality spatial plan. In Livani city, apartment houses occupy about 4% of the city territory. Most of the houses were built after the so-called "114 project series" or as individual projects.

The provisions can be used for various purposes related to the improvement of the technical condition of the building – for the replacement of exterior doors, balcony repairs, roof repairs, replacement of staircase windows and other improvement works. Creating savings takes a long time and savings may not be enough to complete all the planned work.

The establishment and use of a high-quality and professionally thought-out building savings fund will promote the maintenance of the housing stock at an appropriate level and quality, ensuring safe living conditions for the residents.

Keywords: savings fund, facility management, building maintenance, real estate management

JEL codes: L74, L85

CHANGES IN AGGREGATE SUPPLY AND DEMAND AND DEVELOPMENT OF THE REAL ESTATE MARKET

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Abstract. Topicality of the research is – the situation within real estate market is changing, fluctuations and changes in different sectors of real estate market can be regularly observed, which drives the necessity regularly to analyse changes in aggregate supply and aggregate demand. These changes influence the volumes of international investments and thus, the development of real estate market on local and international level. The aim of the research is to analyse the influence of existing situation and changes in aggregate supply and aggregate demand of real estate on international investments and on the development of real estate market, thus analysing its possible influence on local and international investors, by providing different examples. Literature analysis, logical access and comparative analysis methods have been used in the research. Balance in the development of the real estate market could create a favourable situation for the market participants.

Keywords: aggregate demand, aggregate supply, development, investments, international aspects, price changes, real estate market, Europe

JEL Classification: R21, R30, R31, R39, E22, G11, F21

EVALUATION PROBLEMS AND SOLUTIONS OF INVESTMENT PROJECTS IN CONSTRUCTION COMPANY

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Abstract. The investment projects in construction are one of the most important investment projects in India and there is a defined structure of the aforementioned projects. In this connection the assessment, evaluation of the investment projects and the especially evaluation of risks arising in the investment projects in construction, make up a basis of the problem that needs to be analyzed.

A large share of investment activity falls on the construction sector of the national economy, which determines the ever-increasing role of construction in creating conditions for the dynamic development of the economy as a whole, that assures topicality of this study.

Basing on all the mentioned above, the authors has developed the aim of the study: to analyze the evaluation problems of investment projects of commercial and infrastructure construction companies in India and develop practical solutions for evaluation investment projects.

To reach the aim following tasks are to be fulfilled: investment policy in India is analyzed, the theoretical analysis of the scientific literature and publications about the investment projects are conducted, a survey among Indian project managers in construction companies to define the investment project problems and evaluation methods used are developed, conclusions about the evaluation and problem management of the investment projects in construction in India and directions for improvement of the evaluation and problem management are shown.

The study uses the following methodology: mixed methods, both quantitative and qualitative. The primary data is acquired via the survey, the secondary data is acquired from the theoretical literature and the Indian statistical market overview data.

The results of study may be used as the basis of the future research of the evaluation of the projects in other countries, as the methodology proved the reliability of the data and can be similarly imposed on other markets.

Keywords: India, investment project, project evaluation

DIGITALISATION OF THE REAL ESTATE INDUSTRY AND POSSIBLE BUSINESS MODEL

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Abstract. The innovation of new technologies and digitalisation is increasing in a large amount for the past two decades. This innovation has brought huge implications and changes in many industries all over the world. The implementations of these technologies can add up value for both the property owners and the tenants.

In the study the authors analyse the impacts of technologies in real estate and create a new business model, that is suitable for the upcoming start-ups and present real estate companies in Latvia. The object of the study is real estate market, the subject – assessment of digitalisation in the real estate market. The aim of the study is to develop possible business model implementing digitalisation in real estate sector.

The tasks of the study are to assess the digitalisation in real estate sector, their impacts due to technological innovations and possible opportunities for the organizations, to analyse the existing and emerging technologies and their possibility of implementing in the real estate, based on the type of sector they belong, to identify the problems in the existing traditional business model setup, that did not adopt digitalisation in them, to do interview on real estate business in Latvia, and their opinion on implementing technologies and innovations in their business setup, to examine all the factors of the business model and develop new possible business model with implementation of technologies and innovations of digitalisation.

The Methodology of the study are the generally accepted methods of analysis of literatures, scientific thesis and articles, the qualitative and quantitative research methods, comparative analysis method. The Limitations for this study are limited to answer the research questions stated above.

In the conclusions, the result with new business model is highlighted with all supported research works. This can be an opportunity for the organizations and the start-ups that are about to implement considering all the advantages of digitalisation. The proposal of the study is also done with reference to the data source and publications.

Keywords: business model, digitalisation, real estate sector

MULTI-STOREY APARTMENT BUILDING MANAGEMENT FEATURES, PROBLEMS AND SOLUTIONS IN LATVIA

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Abstract. One of the foremost important fundamental rights' ensuring a person's healthy existence is that the right to quality housing. The Latvian housing market is characterized by a high proportion of residential properties owned by private persons; moreover, residents mostly own apartments instead of other types of real estate.

The actuality of the study is that Latvia faces significant social and economic challenges over the next 20 years with respect to the structural weakening of its multi storeyed residential building stock.

The aim of the study is to analyse the multi-storeyed apartment building management features, problems in the management and solutions for the problems raised. The following tasks that have been set for the study: to determine theoretical approaches by using scientific literature and other sources, to analyse the system of influencing factors of apartment building property management, to analyse the problems of apartment building property management, to collect quantity data on the object's findings, to draw solutions for the problems in apartment building property management, to work out improvement proposals.

The object of the study is the management of multi-storeyed apartment buildings in Latvia, the subject – the features and problems in the multi-storeyed apartment buildings in Latvia and the solutions for the problems found out during the study. The study is based on both published and unpublished sources, books on building management and real estate management, publications, scientific articles of international conferences, European Union Laws, regulations, laws, information relating to the Latvian economy construction industry, Ministry of economy of Latvia, different internet sources and interviews of experts.

Keywords: Latvia, management, multi-storeyed apartment building

SAMPLE SELECTION CRITERIA FOR THE VALIDATION OF COMPLIANCE COST ASSESSMENT METHODOLOGY IN THE BANKING MARKET

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Abstract. In the field of the economics' regulation researchers so far have built the conceptual framework showing how the deadweight loss of market failures decrease and costs of the government intervention increase with the increased level of the government intervention. To quantify relationships between the level of intervention, intervention costs and the deadweight loss with econometric models it is important to understand how to quantify the market participants' compliance costs as a part of intervention costs. When methodology is selected validation process starts to validate methodology's appropriateness. The objective of the research presented in this paper is to find the appropriate criteria for sample selection of banks used for validation purposes.

Research presents criteria selection methodology, showing that main components there are market share, data availability in the Bloomberg system in the required format, data availability for 5 reporting years and data availability for the position of "Total Operating Expenses" in the financial statements. Criteria selection methodology shows that in general it works as expected, i.e., main market players have been selected for the validation.

Research results will be used to validate methodology used for compliance cost assessment and subsequently assess all government intervention costs (other positions include regulation costs and other indirect costs) and finalize the quantification of the framework. Quantified framework could be used for more precise policy making regarding the regulation of the banking market.

Research methods used: literature analysis, descriptive statistics.

Keywords: Banking market, deadweight loss, intervention costs, market regulation, compliance costs.

JEL Classification: D60, G18





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Why does the future of the European Union climate goals depend on housing managers?

Climate change affects every region of the world. The polar ice caps are melting, the sea levels are rising. Extreme weather events and rainfall are becoming more frequent in some regions, while others are suffering from increasingly severe heatwaves and draughts, and these changes are expected to intensify in the coming decades. One of the main drivers of the accelerated climate change is CO2 emissions and the extensive overuse of the land resources. But oftentimes we think of these problems as something far-off and do not concern us. But this problem is a lot closer to home than most would have thought. Literally.

The wasted energy

Collectively, buildings in the European Union are responsible for 40 % of the total energy consumption and 36 % of greenhouse gas emissions, which, according to the 2020 report of the European Commission, mainly stem from construction, usage, renovation and demolition. Improving energy efficiency in buildings therefore has a key role in achieving the ambitious goal of carbon-neutrality by 2050, set out in the European Green Deal.

Today, roughly 75 % of the EU building stock is energy inefficient. This means that a large part of the energy used is wasted. Such energy loss can be minimised by improving existing buildings and striving for smart solutions and energy efficient materials when constructing new houses.

Europe needs to improve the energy performance of its buildings. Renovating existing buildings could reduce the EU's total energy consumption by 5-6 % and lower carbon dioxide emissions by about 5 %. Yet, on average, less than 1 % of the national building stock is renovated each year. (Member State rates vary from 0.4 % to 1.2 %.) In order to meet these climate and energy objectives, the current rates of renovations should at least double. So, rather than just concentrating on new buildings, the bigger challenge is in moving the existing building stock towards low energy standards.

The missing knowledge

Today, it is common for owners of apartment buildings to delegate building maintenance to a professional housing management company. This is the practice in both Western and Eastern Europe. However, in the former Eastern Bloc countries, there is a heterogeneous structure of apartment owners, and most often the owners are natural persons also living in their solely owned dwellings.

The proficiency of the housing manager in administrating buildings and communicating with the owners plays an important role in improving the general conditions and energy efficiency of the building. Usually, the housing management is provided by a private company, which has several competitors in the market, all of whom are concerned to provide an appropriate service. Housing manager is a figure, who has all the instruments to initiate and implement projects that would increase energy efficiency in the buildings.

Unfortunately, many housing managers do not have enough knowledge in this process and are not being encouraged to act neither by the customers/ owners, nor by the state. Therefore, while creating new policies on how to boost the renovation wave in Europe, housing managers should be prioritised, as they are able to play the most important role in bringing the EU building stock to net-zero by 2050.

"In order to achieve the building energy efficiency objectives specified in development planning documents of Latvia (NAP 2027, NEKP 2030, and the Strategy for Building Renovation), adequately educated house administrators skilled in the field of energy efficiency are required to implement measures for increasing energy efficiency and to ensure proper maintenance of buildings following the implementation of said measures," says Ineta Geipele, Head of Department of Construction Entrepreneurship and Real Estate Economics and Management of Riga Technical University (RTU).

Closing the gaps

One of the instruments to strengthen the impact of the housing managers could be additional or obligatory certification of the managers. Currently, there are no consistent requirements for housing managers and only a few member states including Latvia require specific education in order to undertake the management of a real estate property, which results in unavoidable gaps in skills and competences while managing buildings, especially when organising renovation processes. Therefore, German association of real estate managers (Verband Immobilienverwalter Deutschland – VDIV) developed a training for local housing managers focused on implementing energy efficiency measures in multi-family houses, which is called Klimaverwalter (Climate administrator).

"The experiences of the course make it clear that climate and building protection in a residential property cannot succeed without qualified housing managers. They are crucial as intermediaries at the interfaces between owners, tenants, service providers, construction companies and energy consultants to enable energy efficiency measures in homeowner associations," says the president of the German umbrella association of real estate managers (Dachverband Deutscher Immobilienverwalter – DDIV) Wolfgang D. Heckeler.

Change in competences, change in attitude

The modular certificate course "Certified Climate Administrator (DDIV/EBZ)" is funded by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety as part of the National Climate Protection Initiative. Based on the various phases of the refurbishment process, this course uses attendance blocks, webinars and self-study phases to impart construction, installation technology and legal expertise as well as knowledge of financing and funding in order to be able to competently accompany and coordinate refurbishment processes. In addition, key competences are promoted, for example, for project and conflict management. The first pilot training was finished by 22 practitioners – housing managers, who are successfully adopting the acquired knowledge in their daily work.

One of the participants of the *Klimaverwalter* training, Mr. Thiele declares: "The most important and future-oriented aspect of the training was climate protection, which should be the priority of each agenda. I have also appreciated useful information about technical prerequisites (technology, heating systems, thermal insulation) and changes associated with thermal protection of the buildings."

"Particularly helpful for me were the topics of heating modernisation, insulation of the building envelope, roof insulation, taking out WEG loans and also the minimum requirements regarding energy use of new and renovated buildings. These topics are discussed in the communities and the topic of heating systems in particular is taking up more and more space in the work," says another participant, Ms. Günther.

"Holistic fiduciary building management also concerns building protection from the point of view of energy efficiency. We have created a further training offer that closes an important gap and promotes competences that are indispensable especially for managers without technical departments," says Klaus Leuchtmann, CEO of the European Training Centre of the Housing and Real Estate Industry (Europäisches Bildungszentrum der Wohnungs und Immobilienwirtschaft (EBZ)), explaining the special benefit of the format.

There is still a long way to go. Having qualified housing managers is not enough to achieve the climate goals by 2050. There is place for improvement in the general image of a housing manager – effort needs to be made to make the profession more attractive and respected in the society because of the large role every housing manager plays in the renovation process. This could be done by improving the administrational skills of the managers and providing transparency of the services and costs. Another important component would certainly be increased financial benefits or additional funding, which could rapidly improve the quality of the services housing managers are providing.

The importance of housing managers is severely underestimated – they could provide the biggest impact in solving many of the energy efficiency problems in the EU. The current attitudes towards this profession must change – they are the leaders of the approaching renovation wave. And the new training programme certainly aims change these attitudes. 2050 might seem like an eternity away, but, as time has proven more than once – it flies by with an incredible speed.

Become the leader of the renovation wave!

Professional trainings for housing managers in Poland and Latvia will be developed and presented in 2022. Further information will be available soon, but in the meantime – make sure to subscribe to a newsletter and be ready to conquer the frontline of the approaching renovation wave!

Development and implementation of training curricula for housing managers, focusing on implementing energy efficiency measures in multifamily housing (MFH) is now underway. A new approach will be prepared for transfer to Poland and Latvia from Germany, where innovative curricula and trainings for professional housing managers has been developed.

CLI-MA began in October 2020 and will conclude in March 2023. The project is implemented in the framework of the European Climate Initiative ("EUKI") 2020.

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COMPARISON OF HOUSING MANAGEMENT QUALIFICATION SYSTEMS IN GERMANY, POLAND AND LATVIA

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Abstract. Issues of managing multi-apartment residential buildings (MARBs) are related not only to residents and owners but also to overall interest of the country. Currently only a part of the buildings corresponds to modern energy efficiency requirements. Therefore, renovation of these buildings should be enhanced. More attention, support and knowledge are needed to promote the renovation of MARBs, which can be encouraged by involvement of the housing managers that are responsible for building management. However, housing managers often lack the knowledge and skills to initiate and implement such projects. The housing management qualification system in Germany, Poland and Latvia has been studied and compared within the framework of the European Climate Initiative (EUKI) project "From Housing Manager to CLImate Manager". The results of the study include an overview of the place and role of housing manager, as well as their relation to building renovation processes in the country. To eliminate the insufficiencies in the qualification of housing managers in Germany, EUKI has already financed the project "Klimaverwalter", within the framework of which an innovative training scheme was developed and introduced for the acquisition of the required competence. The goal of the study is to identify strategies on how to improve the existing training and/or education system in Latvia and Poland through knowledge transfer from Germany.

Keywords: energy efficiency, housing manager, multi-apartment buildings, residential houses

JEL Classification: L85, Q49, Q54, R39

PROFESSIONAL QUALIFICATION OF HOUSING MANAGERS IN LATVIA WITH REGARD TO CLIMATE CHANGE MITIGATION

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Abstract. According to the "Law on Administration of Residential Houses" a person is entitled to perform an administrative task in a multi-apartment building when having acquired the professional education required for the management of residential buildings and a specified level of professional qualification. The fourth level of professional qualification - theoretical and practical training, which provides an opportunity to perform complicated artisan work, as well as to organize and manage the work of other specialists. Housing manager plans, organizes and leads operational work, renovation, reconstruction and restoration of the housing and adjacent territory, as well as prevents damage according to the specific features of the object and ensures record-keeping of the real estate. One of the housing manager's duties is the provision of the energy efficiency requirements. This duty determines a number of tasks: organizing compliance with energy efficiency requirements, organizing activities for the implementation of the required measures on increasing energy efficiency, ensuring that the engineering systems of the building are inspected and ensuring the energy certification of buildings. To perform these tasks housing manager needs the following competencies: the ability to ensure minimum energy efficiency requirements and the implementation of measures for increasing energy efficiency in accordance with laws and regulations, the ability to ensure the energy certification of the building in accordance with laws and regulations, the ability to ensure the inspection of the heating and ventilations systems of the building in accordance with laws and regulations, the ability to ensure that the requirements set for the buildings as an environmental object are met in accordance with laws and regulations. Additional knowledge will be acquired in the training course programme within the EUKI CLI-MA project, where the transfer of knowledge from Germany to Latvia and Poland will take place.

Keywords: energy efficiency, housing manager, multi-apartment building, residential houses

JEL Classification: L85, Q49, Q54, R39

BUILDING-UP SKILLS OF REAL ESTATE MANAGERS IN POLAND IN VIEW OF EUROPEAN GREEN DEAL

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Abstract. In the context of high-level goals, particular importance is given not only to the declaration of ambitious modernization of multifamily buildings itself, but also to the method of pursuing the goals set out in the European Green Deal, which can only be achieved by the cooperation of building owners and managers, who should complete such a process by 2050. They should have knowledge of what, how and how much can be improved to improve the energy standard of their buildings. with the greatest economic effect for its inhabitants. Current functioning of the real estate managers' market is not conducive to the obligatory improvement of professional qualifications, therefore all initiatives changing this situation should be supported by both voluntary associations and the managers themselves. Social research has shown that the areas for expansion most often indicated by managers are basic knowledge of the energy efficiency of buildings (21% of responses) and knowledge about obtaining and using funds for investments related to the improvement of the energy efficiency of buildings (19% of responses). An important area seems to be the need to exchange experiences between managers - indicated by 12%, but this is an area with potential. Almost all managers are aware of the economic benefits that result from improving the energy efficiency of multi-family buildings. To improve the situation of managing and administering the Home Owners Associations and reduce their negative impact on climate change, the new training curricula will be developed in stationary and e-learning mode.

Keywords: building-up skills, climate change mitigation, energy efficiency, multifamily buildings, training of real estate managers

JEL Classification: L85, Q49, Q54

WHY DOES THE FUTURE OF THE EUROPEAN UNION CLIMATE GOALS DEPEND ON HOUSING MANAGERS?

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Abstract. Europe needs to improve the energy performance of its buildings. Renovating existing buildings could reduce the EU's total energy consumption by 5-6% and lower carbon dioxide emissions by about 5%. The proficiency of the housing manager in administrating buildings and communicating with the owners plays an important role in improving the general conditions and energy efficiency of the building. Unfortunately, the importance of housing managers is severely underestimated – they could provide the biggest impact in solving many of the energy efficiency problems in the EU. The current attitudes towards this profession must change – they are the leaders of the approaching renovation wave. One of the instruments to strengthen the impact of the housing managers could be additional or obligatory certification of the managers. Professional training would increase quality of housing management and enable a positive change of this profession.

Keywords: buildings, energy efficiency, green deal, housing manager, professional training, renovation wave

JEL Classification: L85, Q49, Q54

HOUSING POLICY IN LATVIA

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Abstract. In the concept of housing policy development, the processes of sustainable preservation of residential buildings can be treated in two ways: development based on local resources and conditions, or purposefully managed development determined by a purposeful state and municipal regional development policy. Such classification is based on the housing policy development mechanisms or driving forces systematization. Various approaches can be used to achieve the set housing policy goals: tactical development, which is aimed at achieving short-term positive effects (often for political purposes), and strategic development, which envisages achieving long-term positive effects in the socio-economic field.

In Latvia, housing policy is closely related to general sectoral policies, the wellbeing of the population, as well as the reduction of social exclusion, characterizing the development of the country. Housing policy in Latvia is developed in three stages: renovation of the housing stock, paying special attention to energyefficiency, development of the social housing stock and construction of new housing. State housing policy was last defined in 1996, when the Housing Policy Concept was issued. It should be noted that since 1996, the housing sector has developed rapidly, there has been a period of economic downturn, which also affected the development of housing, as well as the historical political document has lost its relevance. There is currently no topical political document formulating housing policy in Latvia, its goals, development directions and action measures to achieve them, despite extensive discussions at the state and local government level and in society, including various support programs used for housing development and improvement of the technical condition.

Keywords: housing policy, housing stock, residential building, sustainable conservation, sustainable development

JEL Classification: K11, K25, L38, L85, L88

MULTI-APARTMENT RESIDENTIAL HOUSE MANAGEMENT SYSTEM AND ITS INFLUENCING FACTORS

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Abstract. The management system of multi-apartment residential buildings and its processes include the main stages of obtaining information feedback that affects its operation. The technical, moral and visual quality of multi-apartment residential buildings influences the demand from apartment owners and the analysis of the industry market helps to make efficient decisions for choice of resources. The housing management system is influenced by several economic and non-economic factors that limit the level of development of the management system and, as a result, the level of well-being of the population that could be achieved in the future. The main task of the research is to systematize the external and internal factors that affect the management process. The aim of the research is to find out the main processes of the multi-apartment residential house management system and the factors influencing them. During the research, 4 factors influencing the external environment are distinguished in the management system of multi-apartment residential buildings: economic factors, legal factors, technical, information technology and environmental factors, and social and psychological factors.

The management system of multi-apartment residential buildings performs 3 main tasks: collects information about the managed industry; processes the information received and has a leading impact on the industry. The efficiency of the residential house management business is also affected by internal factors affecting the company's environment. The company's internal environment and how harmoniously the company can perform its functions by interacting with external factors affecting the environment determine its operational efficiency. The quality of housing can be viewed as an abstract expression of the esthetical norms of society. These are not only the material and technical requirements for a dwelling house, but also social relations, rights and obligations of the owner and tenant, economic conditions, correspondence between the expenditure on housing and the income of the apartment owners, ecological conditions. In turn, the efficiency of management companies affects the management system of the entire multi-apartment residential building.

Keywords: apartment owners, legal factors, management system, multiapartment residential house, management system, property rights, residential house manager

JEL Classification: L21, L51, L74, L85, M21, P14

IMPORTANCE OF MAINTENANCE PHASE IN MULTI-APARTMENT RESIDENTIAL BUILDINGS

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Abstract. Maintenance of a multi-apartment residential buildings is crucial part of the multi-apartment residential building lifecycle. During maintenance phase building manager should act on three main activity types from planning viewpoint. At first, plan and proceed with planned long-term repairs, what are due technical parameters and usable life-time of the materials and technologies used in construction and maintenance during previous periods. Another source to plan and act are tasks and repairs needed on a period of about a year. Third source is to act on problems identified during planned or unplanned inspection due to some incident if not solved during incident event. All identified activities have to be included in maintenance plan of an upcoming period for approval and delegation of finances. Advancements to improve building's sustainability aspects have to be analysed for a need to plan and apply for construction permit due to the scope of works and complexity. Management company can initiate a suggestion to decision makers for a review and approval of improvements. Approval of maintenance plan also is commitment for funds needed for implementation of planned activities. Improving building's technical condition leads closer to climate neutral building with reduced carbon footprint. Research is aimed at identifying critical aspects with significant impact on decision-making for sustainability improvements during maintenance phase in multi-apartment residential buildings. Research results identify that important obstacles for renovation in Latvia are hindering incentive approval for improvement. These obstacles are feasible financing options for owners, complex approval of decision for renovation and discrepancies of owner's perception on short-term and long-term benefits, especially if ownerships are split. Thus, renovation process in Latvia is stagnating. Authors recommend to develop and implement means to increase environmental awareness and to clarify long-term perspective's economic and environmental benefits.

Keywords: costs, financing, lifecycle costs, operations, renovation, sustainable buildings

JEL Classification: L74, Q51, Q56

RENOVATION OF MULTI-APARTMENT BUILDINGS WITHOUT SUPPORT OF THE EU STRUCTURAL FUNDS

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Abstract. The renovation of multi-apartment residential buildings requires a long-term strategy, which has already proven the activity of renovation of building is closely related to the state's involvement and activity with the activities of the grant program. It is important to understand the strengths and weaknesses of the current grant program period up to 2023 and the future trends in state support for the renovation of multi-apartment residential buildings, in addition the financing opportunities, the choice of technologies and materials to be used.

In research, used data form the program of renovation of multi-apartment residential buildings implemented by the LIAA, which was implemented during period until 2013, as well as the data of the progress report of Development Finance Institution Altum on the renovation of multi-apartment residential buildings.

In research, is important to understand the main trends and characteristics of energy consumption before and after renovation of multi-apartment residential buildings need to understand the changing markettrends and changes in regulatory requirements, which directly affect the choice of technology and materials, hence the variable costs of renovation.

In addition, in the research simulates long-term, future energy efficiency trends after 2023 are modeled on different scenarios that consider both the commitment and targets of Latvia in the field of energy efficiency, the energy efficiency indicators of the technologies and materials used, and the different financing options for the renovation of multi-apartment residential buildings.

It is important to understand what the tools might be to raise awareness among the flat owners in favor of improving the energy efficiency of housing, as well as what might be the most successful financial aid or incentive rules that would stimulate to vote in favor of renovating buildings and improving energy efficiency in multi-apartment residential buildings.

The advantages and disadvantages of the current program are being assessed from the practical point of view, how the processes of the Altum (Multi-apartment building energy efficiency) program operate directly, evaluation the projects from the stage of preparation the technical documentation, the construction work, and the achieved results of the projects. **Keywords:** energy efficiency, financing, grant program, multi-apartment buildings, renovation

JEL Classification: 013, Q43