European Proceedings of
Multidisciplinary Sciences
EpMS

www.europeanproceedings.com
e-ISSN: 2421-826X

DOI: 10.15405/epms.2024.09.86

MTMSD 2022
I International Conference «Modern Trends in Governance and Sustainable Development of Socio-economic Systems: from Regional Development to Global Economic Growth»

LAND MARKET SUSTAINABILITY CONCEPT AND ITS DEVELOPMENT TRENDS

Natalya Mikhailovna Styazhkova (a)*, Yulia Olegovna Smirnova (b),
Kirill Yurievich Kulakov (c)
*Corresponding author

(a) Penza State University of Architecture and Construction, Penza, Russia, ulaol@mail.ru
(b) Penza State University of Architecture and Construction, Penza, Russia, styazhkova_nm@yandex.ru
(c) Moscow State University of Civil Engineering, Moscow, Russia, kkulakov@bk.ru

Abstract

This research aims to explore the concept of sustainability in the context of land markets and analyze the evolving trends shaping its development. The study employs a multifaceted approach, integrating qualitative and quantitative methods to gather comprehensive insights. The research draws on extensive data from various sources, including academic literature, government reports, and empirical studies, to illuminate the complexities of sustainability within the land market. One prominent result of the investigation is the identification of key factors influencing the sustainable development of land markets. The research delineates the intricate interplay between environmental, economic, and social dimensions, shedding light on the challenges and opportunities embedded in sustainable land use. Furthermore, the study delves into emerging trends, such as technological advancements, policy dynamics, and changing consumer preferences, which significantly impact the trajectory of land market sustainability. In conclusion, the research underscores the imperative for a holistic understanding of sustainability in land markets, recognizing it as a multifaceted concept that extends beyond environmental concerns. The findings contribute valuable insights for policymakers, urban planners, and stakeholders involved in land management, providing a foundation for informed decision-making to foster sustainable land practices in the future.

Keywords: Circular economy, development, harmony, land market, life cycle, sustainability

https://doi.org/10.15405/epms.2024.09.86
Corresponding Author: Natalya Mikhailovna Styazhkova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

1. Introduction

In the current conditions of development, the global concept of sustainable development (Blasi et al., 2022) requires its creative application in all types of commodity markets, including the problems of scientific and practical modeling of the theory of sustainable functioning of the land market. This is especially true in the context of growing turbulence in the economic development of both Russia and the entire world community. The reviewed studies showed (S. A. Baronin & Lyulkina, 2015; S. A. Baronin & Kulakov, 2016; Gorb, 2017) a wide range of trends and target indicators for the development of the land market (S. A. Baronin et al., 2023).

The need for theoretical developments in the field of modeling the sustainable development of the land market predetermines the priority of developing a specialized concept of sustainability. In this regard, we consider the problems of modeling the sustainable development of the land market to be linked with models of sustainable development of territories. At the same time, the principle of advancing synchronous development of the land market in relation to the sustainable development of territories must be observed. It seems important to ensure the requirements for sustainable development of both construction areas and land plots from the standpoint of implementing the principle of harmony (S. A. Baronin et al., 2023).

At the same time, the harmony of the land market should be understood as a set of qualitative properties of the components of the land market system, which allow implementing the ideology of the eco-market in it through priority environmental orientation, ethical use of natural resources, environmental protection, green and cyclical economy in an equilibrium net combination with urban planning solutions. in the field of land improvement based on the sustainable development of a comfortable environment for human life. In our opinion, harmony as a principle of market sustainable functioning should become a tool to reduce the developing turbulence of world economic development based on the formation of the prevailing type of thinking of mankind in all spheres of management, including all types of the commodity market (S. A. Baronin et al., 2023).

The working hypothesis of the study suggests that the solution of the above problem situation predetermines the need for conceptual modeling of the land market as a specialized commodity market for sustainable development based on the application of advanced requirements for environmentally friendly, green, energy-efficient solutions, a circular economy and other advanced engineering standards of construction through the possibility of forming a special demand and supply for land plots with an innovative type of permitted use for the sustainable harmonious development of territories (S. A. Baronin et al., 2023).

The purpose of the research is to develop a set of theoretical provisions, concepts, principles, organizational and economic mechanisms, paradigms and new empirical knowledge on modeling a sustainable harmonic land market capable of generating advanced requirements for the sustainability of territories in investment projects and programs based on the mandatory cost management of environmentally-oriented life cycles capital construction objects at the stage of land development (S. A. Baronin et al., 2023).

https://doi.org/10.15405/epms.2024.09.86
Corresponding Author: Natalya Mikhailovna Styazhkova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

The proposed scientific novelty will consist in the development of innovative principles, theories, methodologies and methodological provisions for modeling the institutional tool for long-term economic transformation of the land market based on the expanding functioning of the innovative segment of the land market with a special type of permitted use for sustainable harmonious development of territories (S. A. Baronin et al., 2023).

Scientific novelty is also additionally formed due to the use in this research project of the use, along with traditional indicators of types of costs (market, investment, liquidation, mortgage), innovative types of evaluation of processes and objects of development: life cycle cost assessment; valuation of contracts for life cycles; assessment of the cost of ownership of life cycles and real estate objects of various profiles; land valuation by methods of intended use and residual technique; a comprehensive assessment of the cost of developing territories, as well as cost engineering models in relation to environmentally-oriented life cycles of capital construction projects. This predetermines the receipt of a wide range of scientific novelty in cost modeling and cost management in the organizational and economic mechanisms of sustainable harmonic synchronous development of both the land market and the territory development market.

The theoretical economic modeling of the processes of a sustainable harmonic land market is based on the understanding of two fundamental situations for the implementation of investment projects: a) a traditional project with standard requirements for sustainability (project A); b) a project with increased requirements for green, environmental, energy-efficient, technical and technological standards (project B) (S. A. Baronin et al., 2023).

The main problematic situation in the implementation of the concept of sustainable development of the land market of territories lies, in our opinion, in the action of two mutually exclusive trends: firstly, it is the priority of maximizing the income of the state and municipalities from the sale of land plots to citizens and legal entities (V1); secondly, it is a decrease in investment attractiveness (V2) for land plots and projects that must be implemented with increased requirements for green standards, environmental friendliness, energy efficiency, innovativeness of technical, engineering and technological solutions, and the level of application of digital information technologies. This predetermines a significant increase in the cost of capital investments and the risks of implementing these investment projects and programs (IP) (S. A. Baronin et al., 2023).

2. Materials and Methods

The study employed a comprehensive set of modern epistemological tools, incorporating abstract-logical, statistical-economic methods, as well as techniques from socio-economic forecasting, extrapolation, and mathematical analysis. The methodological framework drew inspiration from both fundamental and applied research in the general theory of stability, encompassing notable contributions from scholars such as Gorb, Baronin, Kulakov, Emas, Grebenshikov, and others (S. A. Baronin & Kulakov, 2016; S. A. Baronin & Kulakov, 2018; Butova et al., 2022; Emas, 2015; Gorb, 2017; Grebenshikov et al., 2017).

The theoretical underpinning of the study was grounded in classical economic theories and works by Russian and foreign scholars focusing on legal sustainable development and the regulation of

https://doi.org/10.15405/epms.2024.09.86
Corresponding Author: Natalya Mikhailovna Styazhkova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

territorial land markets (S. Baronin & Kulakov, 2020; Tomislav, 2018). Additionally, methods for assessing the cost of life cycles and ownership were considered within the theoretical framework.

Empirical data were sourced from official United Nations documents, the works of leading European scientists, studies conducted by domestic organizations in the field of sustainable development, and state, regional, and sectoral statistics from the Russian Federation. The information base comprised legislative and regulatory documents from federal and regional authorities, printed and electronic publications, materials from research and scientific conferences related to the research problem, and the outcomes of the authors' scientific research.

Official reports from the United Nations and the Federal Service for State Registration, Cadastre and Cartography, specifically state reports on the state and use of land in the Russian Federation spanning from 2005 to 2022, constituted essential materials for the study. This robust combination of theoretical, empirical, and legislative sources formed the methodological foundation for a thorough exploration of sustainability in land markets and its development trends (S. A. Baronin et al., 2023).

3. Results and Discussion

3.1. The main trends in the development of the land market of the Russian Federation with the justification of the prerequisites for its transformation into a stable harmonious type of commodity market

The research delved into a multifaceted exploration of land market sustainability and its evolving trends. Utilizing modern epistemological tools and a diverse range of methods, including abstract-logical, statistical-economic, socio-economic forecasting, and mathematical analysis, the study offered profound insights.

The findings are rooted in a theoretical framework that integrates fundamental and applied research in the general theory of stability, incorporating influential works by scholars such as Gorb, Baronin, Kulakov, Emas, and Grebenshikov. This robust foundation enabled a nuanced understanding of the complexities inherent in land market dynamics.

The empirical dimension of the study drew from authoritative sources, including official United Nations documents, works by leading European scientists, and domestic studies on sustainable development. The inclusion of state, regional, and sectoral statistics from the Russian Federation provided a solid basis for assessing the practical implications of sustainability measures.

The discussion encompassed a broad spectrum, ranging from the legal aspects of sustainable development to the regulation of territorial land markets. The study also delved into methods for evaluating the cost of life cycles and ownership, contributing to a comprehensive understanding of the economic dimensions involved.

In particular, the research examined the state reports on land in the Russian Federation from 2005 to 2022, shedding light on the evolving landscape and utilization patterns. This empirical grounding facilitated a practical assessment of how sustainability principles manifest in the real-world context of land use.

https://doi.org/10.15405/epms.2024.09.86
Corresponding Author: Natalya Mikhailovna Styazhkova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

The amalgamation of theoretical insights and empirical observations forms the basis for a comprehensive discussion on land market sustainability. By intertwining various disciplinary perspectives and methodological approaches, the study not only identifies key trends but also provides a nuanced understanding of the intricate dynamics shaping the sustainability concept in land markets (Scherz et al., 2023).

In the course of the research, the main modern trends in the development of the land market were identified. According to federal statistical monitoring, as of January 1, 2021, 133.0 million hectares of land were in private ownership, which amounted to 7.8% of the country's land fund. Of these, the area of land owned by citizens amounted to 110.1 million hectares, or 6.4%, 22.9 million hectares, or 1.4% of the land fund of Russia, were owned by legal entities. The area of land owned by the state and municipalities amounted to 1,579.6 million hectares, or 92.2% of the land fund of the countries. The land shares of citizens (including the right in common joint ownership) in the land fund of the country amounted to 4.6% (78,596.6 thousand hectares), or 60.3% of private property in the country as a whole. The following changes occurred in the structure of ownership of land plots in the Russian Federation in 2020: there was a decrease in the area of land plots owned by citizens (by 1,047.4 thousand hectares), and an increase in the ownership of legal entities (by 999.0 thousand hectares), as well as state and municipal property (per 100.0 thousand ha). The changes largely concerned land plots that are on the right of common (share or joint) ownership of citizens (the decrease amounted to 1783.5 thousand hectares) (S. A. Baronin & Kulakov, 2018). The study analyzed the distribution of land by category for the period from 2005 to 2020. based on the official data of Rosreestr published in state (national) reports on the state and use of land in the Russian Federation for the specified period (S. A. Baronin & K. Y. Kulakov, 2015; S. A. Baronin & K. Y. Kulakov, 2018). The largest territories are traditionally occupied by forest fund lands, for the period from 2005 to 2020 showing growth both in absolute terms (from 1104.9 million hectares in 2005 to 1127.6 million hectares in 2020) and in relative terms (from 64.6% of the total land area of the Russian Federation to 65.8 %). Also, a significant share (at least 20%) is occupied by agricultural land, which, at the same time, showed a decrease in the total area of the category from 401.6 million hectares in 2005 to 380.8 million hectares in 2020, i.e. by 5.2%. Among the lands of settlements, there was also some growth within the category from 19.1 million hectares in 2005 to 20.6 million hectares in 2020, evenly distributed between urban and rural settlements. Special attention should be paid to the analysis of changes in the distribution of the land fund of the Russian Federation by land categories as a percentage of the previous year. The most uneven change occurred in the category of lands of specially protected territories and objects, reaching a peak value in 2012 at the level of 26.3%. The legal regime of land plots referred to this category depends on the legal regime of the territories on which they are located, or the objects that are located on them. The largest increase in the area of lands of the category in 2012 was observed in the Republic of Sakha (Yakutia) (by 946.7 thousand hectares), the Astrakhan region (by 51.3 thousand hectares) and the Trans-Baikal Territory (by 30.4 thousand hectares). The largest drop within the category for the entire study period was revealed in the same 2012 for reserve lands by 8% (S. A. Baronin et al., 2023).

The land market of the Russian Federation was also analyzed by type of property from 2005 to 2020. At the same time, when land owned by citizens and owned by legal entities (hereinafter Land in

https://doi.org/10.15405/epms.2024.09.86
Corresponding Author: Natalya Mikhailovna Styazhkova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

private ownership) is combined, throughout the entire period under consideration, the indicated value will be less than land in state and municipal property, which repeats the trend identified in the Russian Federation. Of interest is the ratio of land in private ownership and in state and municipal ownership - if in 2005 land in private ownership accounted for only 82.83% in relation to the state, then in 2020 it is already 93.70% (the growth of this ratio was quite uniform with the only fluctuation in 2015). This trend illustrates the migration of a part of the land market segment from state ownership to private ownership (the property of individuals and legal entities), however, land in state and municipal ownership still ranks first in terms of area among these segments, and if the pace is maintained, the balance between the segments will not be expected. before 2030.

An analysis of the above trends shows that there are all prerequisites for the transformation of the land market into a market for sustainable harmonious development. Ensuring the sustainable development of territories in a turbulent economy must be carried out through updating the sustainability of the functioning of the land market. This is predetermined by the fact that this type of market is fundamental in managing sustainable socio-economic development of territories, investment projects, programs, enterprises, industries, regions and the country as a whole (Baronin et al., 2023; Hromada et al., 2021).

Undoubtedly, the time has come to talk about the sustainable and harmonious development of the territories, which should be laid down at the stage of the functioning of the land market as an environmentally oriented harmonious system operating on the principles of a green, cyclical and clean economy.

3.2. Theoretical modeling of the concept of a sustainable harmonic land market capable of generating advanced requirements for the sustainability and harmony of the development of territories

The analysis carried out in the field of theory and practice of land markets according to numerous sources devoted to the issues of land market regulation made it possible to carry out the author's modeling of a stable and harmonic land market (Snn). At the same time, the following main elements were adopted as the basis for developing the model: innovative demand; innovative proposal; internal and external environment of sustainable harmonic markets; ways of selling land; appointment; infrastructure subsystem of the market and criteria for socio-economic efficiency. The developed author's local model is presented below (Figure 1).

It is proposed to form innovative supply and demand in this type of market through the initiation of a special type of permitted use of land plots for harmonious and sustainable use. This allows the transformation of the traditional type of land market into an Snn type market with forward-looking requirements for green, green, energy efficient solutions, a circular economy and other advanced building engineering standards (Gushchina et al., 2022).

The transformation process initially provides for the formation of a local and limited segment of the land market in terms of supply and demand for land plots with harmonious and sustainable development of territories. Then this locality will expand and the land market should become predominantly harmonious and stable and meet national and global standards in this area of regulation. As already noted, the formation and functioning of any local segment of the land market occurs under the

https://doi.org/10.15405/epms.2024.09.86
Corresponding Author: Natalya Mikhailovna Styazhkova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

influence of innovative demand and innovative supply. They should be treated as multiple entities: ∑Si; ∑Pi.

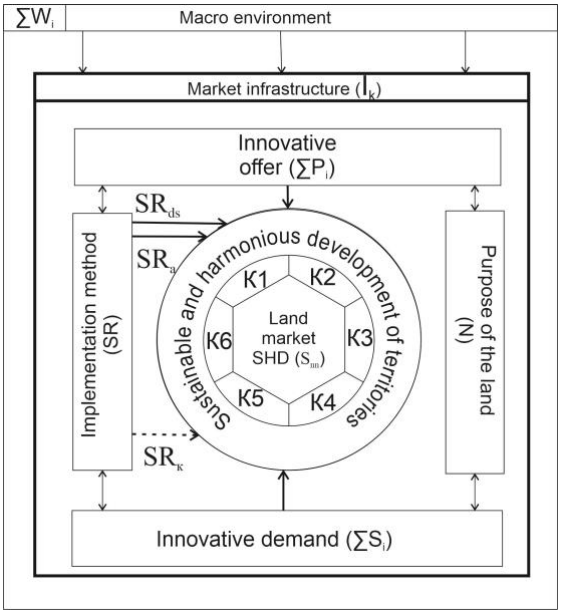

Figure 1. Conceptual model of the land market for sustainable harmonic development (SHD) in synchronization with sustainable harmonic development of territories

According to the method of selling land plots (SR), two types of sales of rights to land plots can be distinguished: auction (SRA) and direct sale (SRDS). The sale of land plots, the ownership of which is not delimited and the rights to which do not belong to third parties, is carried out through auctions. Direct sale is carried out with an unlimited number of sellers and buyers on the secondary land market between individuals and legal entities. However, it is also proposed to introduce a competitive method of sale (SRc), when, in addition to the cost aspect, other parameters of the planned project can be evaluated, for example, environmental friendliness, greenness, etc.

The market model of the SNN type provides for a multi-criteria approach to the socio-economic efficiency of this type of market. At the same time, it is proposed to single out the following criteria subsystems as the main criteria for sustainability: K1 - the criterion of economic efficiency - the profit of the seller of the land plot K1.1 (the organizer of land sales at auctions, competitions); investor profit K1.2; K1.1 $\longrightarrow$ max; K1.2 $\longrightarrow$ max; K2 - the criterion of social efficiency - the possibility of improving housing conditions for families; K3 - a criterion for the economic reliability of transactions - the quality of legislation, control of corruption, etc.; K4 - a criterion for the efficiency of transactions - consumer satisfaction with the speed of the transaction; K5 - the criterion of "greenness" - environmental friendliness, energy efficiency, harmonious development; K6 is a criterion for minimizing the total costs of environmentally-oriented construction life cycles (determined at the stage of land development).

The market infrastructure (Ik) is also included in the model as a separate element. It includes both state and municipal assistance agencies, as well as private companies that prepare documentation regarding registration of rights to land plots. In the most general form, the model of a sustainable harmonic land market Snn is proposed to be structured in the form of objective functions:

https://doi.org/10.15405/epms.2024.09.86
Corresponding Author: Natalya Mikhailovna Styazhkova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

Snn = f ((∑Si;∑Pi;N;SR;Ik;∑Ti;∑Wi;K1max;K2max;K3max;K4max; K5max) ⟶ max); (f(K6min) ⟶ min) (1)

Snn - local segment of sustainable and harmonious land market; K1, K2, K3, K4, K5, K6 - criterion field of the efficiency of functioning Snn as a multiple subsystem of four units in terms of efficiency, reliability and efficiency; Ik – market infrastructure, which is considered as multiple elements that ensure purchase and sale transactions (state registration of transactions, land surveying, notaries, valuation, insurance, real estate, cadastral registration, etc.); SR - method of selling land plots. It is proposed to single out as the main ones: auction sales - SRa, which are typical for land plots in state and municipal ownership; direct sales – SRds. Separately, it is proposed to highlight the sale of land plots through tenders SRк; ∑Pi - innovative offer of land plots in territorial markets Snn and main influencing factors (Fp).

Thus, the model of a sustainable and harmonious land market should be understood as a set of interacting subjects and objects of innovative demand, taking into account evolutionary transformations based on the special priority of environmentally-oriented reproduction of capital construction objects in the context of sustainable and harmonious development of the territory (S. A. Baronin et al., 2023).

These scientific results are creative, do not pretend to be complete and provide for their further development, taking into account country specifics and further expansion of complexity factors in the conditions of turbulence in world development.

4. Conclusions

The study has brought to light the profound significance of the examined topic, offering a comprehensive analysis of the trends within a segment of the land market undergoing a transition from state to private ownership. This analysis provided valuable insights into the prerequisites for transforming the land market into a realm conducive to sustainable and harmonious development.

Central to the study is the author's conceptual model of a sustainable and harmonic land market. This model adopts a multi-criteria approach to assess the socio-economic efficiency of such a market, with a specific focus on key sustainability criteria. By doing so, it introduces a framework that can effectively guide the management of sustainable and harmonious development within the complex dynamics of the land market.

The complexity and multivariance of the data derived from scientific and practical research underscore the depth and breadth of the issues involved. This study not only reveals the existing state of the land market but also offers a forward-looking perspective, pointing towards potential avenues for sustainable development.

In essence, the conclusions drawn from this research emphasize the evolving nature of land markets and the imperative to integrate sustainability principles for their harmonious development. The proposed model stands as a valuable tool for guiding future endeavors in managing land markets, considering the multifaceted dimensions of sustainability.

https://doi.org/10.15405/epms.2024.09.86
Corresponding Author: Natalya Mikhailovna Styazhkova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

Acknowledgments

The research was supported by the Russian Science Foundation grant No. 22-28-20511 (https://rscf.ru/project/22-28-20511/).

References

Baronin, S. A., & Kulakov, K. J. (2018). Modeling total cost of ownership residential real estate in the life cycles of buildings. *International Journal of Civil Engineering and Technology, 9*(10), 1140-1148. https://iaeme.com/MasterAdmin/Journal_uploads/IJCIET/VOLUME_9_ISSUE_10/IJCIET_09_10_113.pdf

Baronin, S. A., & Kulakov, K. Y. (2015). Developing affordable and energy efficient housing in Russia based on real estate total cost of ownership management. *Journal of Advanced Research in Law and Economics, 6*(2), 291-298.

Baronin, S. A., & Kulakov, K. Y. (2016). Development of the municipal market of land plot auctions for housing constructio n in Russia. *Journal of Applied Economic Sciences, 11*(4), 698-708. https://journals.aserspublishing.eu/jarle/article/view/481

Baronin, S. A., & Lyulkina, N. M. (2015). Features of the development of the market of municipal auction sales of land plots for housing construction in Russia. *Urban studies and real estate market, 1*, 33-41. https://nbpublish.com/library_read_article.php?id=-33531

Baronin, S. A., Guschina, E. S., & Romanova, A. I. (2023). Integrated green construction as a prerequisite for sustainable urban development. *E3S Web of Conferences 403*, 02013. https://doi.org/10.1051/e3sconf/202340302013

Baronin, S., & Kulakov, K. (2020). Residential property ownership valuation and cost management based on energy efficiency measures. *E3S Web of Conferences, 217*, 07005. https://doi.org/10.1051/e3sconf/202021707005

Blasi, S., Ganzaroli, A., & De Noni, I. (2022). Smartening sustainable development in cities: Strengthening the theoretical linkage between smart cities and SDGs. *Sustainable Cities and Society, 80*, 103793. https://doi.org/10.1016/j.scs.2022.103793

Butova, T. G., Klimovich, N. V., & Danilina, E. P. (2022). Instruments for Sustainable Development of Territories in the Context of Synergistic Crisis. *Journal of Siberian Federal University. Humanities and Social Sciences, 15*(6), 780-790. http://journal.sfu-kras.ru/sites/journal.sfu-kras.ru/files/fulltexts/J_HUM_2022_06_total.pdf

Emas, R. (2015). The concept of sustainable development: definition and defining principles. *Brief for GSDR, 2015*, 10-13140. https://sustainabledevelopment.un.org/content/documents/5839GSDR%202015_SD_concept_definiton_rev.pdf

Gorb, O. (2017). Development of complex approach to defining the notion sustainable development of rural territories. *Forum Scientiae Oeconomia, 5*(2), 87-99. *https://ojs.wsb.edu.pl/index.php/fso/article/view/186*

Grebenshikov, V. S., Tutunjyan, A. A., & Baronin, S. A. (2017). Zoning of co-funded construction in the territorial housing markets of the Russian federation entities by risk level. *International Journal of Civil Engineering and Technology, 8*(10), 609-618. https://iaeme.com/Home/article_id/IJCIET_08_10_063

Gushchina, E. S., Budanov, I. V., & Baronin, S. A. (2022). Green Building Simulation as a Sustainable Integrated Residential Development. *International scientific and technical journal real estate: economics, management, 3.* https://n-eu.iasv.ru/index.php/neu/issue/download/20/27

Hromada, E., Vitasek, S., Holcman, J., Schneiderova Heralova, R., & Krulicky, T. (2021). Residential Construction with a Focus on Evaluation of the Life Cycle of Buildings. *Buildings, 11*(11), 524. https://doi.org/10.3390/buildings11110524

Scherz, M., Hoxha, E., Maierhofer, D., Kreiner, H., & Passer, A. (2023). Strategies to improve building environmental and economic performance: an exploratory study on 37 residential building

https://doi.org/10.15405/epms.2024.09.86
Corresponding Author: Natalya Mikhailovna Styazhkova
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2421-826X

scenarios. *The International Journal of Life Cycle Assessment, 28*(7), 828-842. https://doi.org/10.1007/s11367-022-02073-6

Tomislav, K. (2018). The concept of sustainable development: From its beginning to the contemporary issues. *Zagreb International Review of Economics & Business, 21*(1), 67-94. https://sciendo.com/pdf/10.2478/zireb-2018-0005