RIGA TECHNICAL UNIVERSITY

Rashmi Jaymin Sanchaniya

THE CONCEPT OF PROPERTY REUSE SYSTEM FOR THE DEVELOPMENT OF AGE-FRIENDLY SOCIAL HOUSING IN LATVIA

Summary of the Doctoral Thesis

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RIGA TECHNICAL UNIVERSITY
Faculty of Engineering Economics and Management
Economics and Business Institute

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DOCTORAL THESIS PROPOSED TO RIGA TECHNICAL UNIVERSITY FOR PROMOTION TO THE SCIENTIFIC DEGREE OF DOCTOR OF SCIENCE

To be granted the scientific degree of Doctor of Science (PhD) in Social Sciences, the present Doctoral Thesis has been submitted for defence at the open meeting of the RTU Promotion Council on 3 September 2026, at 14:00 at the Faculty of Engineering Economics and Management of Riga Technical University, Kalnciema iela 6, Room 209.

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University of Forestry, Bulgaria

DECLARATION OF ACADEMIC INTEGRITY

I hereby declare that the Doctoral Thesis submitted for review to Riga Technical University for promotion to the scientific degree of Doctor of Science (PhD) in Social Sciences is my own. I confirm that this Doctoral Thesis has not been submitted to any other university for promotion to a scientific degree.

Rashmi Jaymin Sanchaniya ……. (signature)
Date: ……

The Doctoral Thesis has been written in English. It consists of an Introduction, three chapters, Conclusions, 47 figures, and 19 tables; the total number of pages is 201. The Bibliography contains 307 titles.

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INTRODUCTION

The intersection of population ageing and urbanisation presents a critical challenge for cities worldwide. As life expectancy increases and fertility rates decline, the proportion of older adults in urban populations increases rapidly (OECD, 2024). In Latvia, this demographic shift is compounded by a shrinking overall population, leading to a situation in which the majority of the population will soon be over the age of 65 (European Commission, 2024). This trend has profound implications for various areas of urban life, including housing, healthcare, social services and community development. One of the most pressing issues is the provision of adequate, affordable and age-friendly housing for older adults (McGarry, 2018). However, the current housing market in Latvia is not equipped to meet this growing demand.

The adaptive reuse of existing properties presents a potential solution to this housing challenge, offering both environmental and social benefits (Sanchaniya & Geipele, 2023). This approach not only addresses the immediate need for age-friendly housing but also contributes to sustainable urban development by using existing infrastructure rather than requiring new construction. This concept aligns with the principles of a circular economy and supports the efficient use of urban resources while preserving the character of the community.

The Doctoral Thesis explores the concept of property reuse as a potential solution to the challenge of age-friendly social housing in Latvia. Property reuse, which involves repurposing abandoned, under-used or vacant properties for new uses, has gained traction in recent years as a sustainable approach to urban development. By rehabilitating existing buildings and infrastructure, cities can reduce urban sprawl, revitalise neighbourhoods and create new housing and community spaces without the environmental and economic costs of new construction. However, the application of property reuse specifically for age-friendly social housing remains understudied, especially in the context of cities such as Riga.

Previous research in adaptive reuse and age-friendly housing has focused on separate aspects of these fields. Studies by Bullen and Love (2011) have established frameworks for evaluating buildings' potential for adaptive reuse, while research by Van Hoof et al. (2021) and Buffel et al. (2019) has examined the requirements for age-friendly housing development. In Latvia specifically, studies by Treija and Bratuškins (2019) and Krišjāne et al. (2019) have investigated housing estate challenges and urban development patterns, while Rasnaca and Rezgale-Straidoma (2019) have explored housing vulnerability among seniors. Recent study by Kazak (2023) has begun to address intergenerational aspects of social housing, but primarily from a broader perspective of urban development.

However, there remains a significant gap in research that specifically addresses the integration of adaptive reuse strategies with age-friendly social housing development, particularly in the context of shrinking cities like those of Latvia. While existing studies have independently examined property reuse or age-friendly housing, there is limited research on how these approaches can be combined to address the unique challenges of ageing populations in post-Soviet contexts. Additionally, there is a lack of comprehensive methodological frameworks that guide the practical implementation of such integrated solutions, taking into account both the technical aspects of building adaptation and the specific needs of elderly

residents. This Doctoral Thesis addresses this gap by developing a systematic approach to implement property reuse systems specifically designed for age-friendly social housing in Latvia.

The Doctoral Thesis develops a methodological framework for implementing a property reuse system that promotes the development of affordable, sustainable, accessible and community-integrated age-friendly social housing in the community of Latvia. Drawing on a mixed-methods approach that combines qualitative and quantitative methods, such as interviews and focus groups, the study seeks to understand the spatial, social, economic and institutional factors that influence the feasibility and success of such a system. By engaging key stakeholders, including policymakers, urban planners, housing developers and, most importantly, the ageing population themselves, the research plans to ensure that the proposed solutions are not only technically and economically viable but also responsive to the actual needs and preferences of older adults.

The research is highly topical due to Latvia's unique demographic challenges, which are characterised by a declining birth rate reaching a 100-year low of 14,490 births in 2023 or 7.7 births per 1000 inhabitants (LSM.lv, 2024a) and an aging population, with the median age increasing by 1.8 years to 44 years between 2013–2023 and an old-age dependency ratio of 33.1 % (LSM.lv, 2024b). This trend is leading to a situation in which the majority of the population will soon be elderly. However, there is a significant gap in the provision of age-friendly social housing, particularly in Latvia. The research addresses this critical issue by proposing a novel approach that takes advantage of underused land and properties for the development of age-friendly social housing. Developing sustainable technologies that focus on affordability, sustainability and energy efficiency, the research aligns with global trends towards sustainable urban development and the increasing recognition of the need for age-friendly communities. Furthermore, the research is timely, as it provides a proactive solution to an impending social challenge rather than waiting for the crisis to fully manifest itself.

Research questions

1. How can a property reuse system be designed and implemented to foster the development of age-friendly social housing in Latvia?
2. What are the key factors influencing the feasibility and success of a property reuse system for age-friendly social housing in Latvia?
3. How can the perspectives of the ageing population (65+ years) be effectively incorporated into the design and implementation of age-friendly social housing developments?
4. How can the proposed property reuse system contribute to affordability, sustainability, energy efficiency, accessibility, resilience and community integration of age-friendly social housing in Latvia?

The Doctoral Thesis aims to develop a methodological solution for implementing a property reuse system that promotes the development of affordable, sustainable, accessible and community-integrated age-friendly social housing integrated with the community in Latvia, thus addressing the housing needs of the growing elderly population.

To achieve the aim, the following **tasks** were set.

1. Analyse the current state of the social housing market in Latvia, focusing on the needs of the ageing population.
2. Examine the concept of property reuse and its potential benefits for social housing development.
3. Identify and assess the key factors influencing the feasibility of a property reuse system for age-friendly social housing.
4. Develop assessment criteria to identify suitable properties for reuse in age-friendly social housing.
5. Propose design and planning considerations for age-friendly housing developments that incorporate the perspectives of the ageing population.
6. Formulate implementation strategies, including stakeholder participation and regulatory compliance.
7. Develop monitoring and evaluation methods to assess the success and impact of the property reuse system.
8. Propose strategies for the widespread adoption and sustainability of the property reuse system in Latvia.

Hypothesis

Implementing a property reuse system for age-friendly social housing in Latvia will significantly enhance housing affordability, sustainability and community integration for the ageing population, while promoting efficient land use and urban regeneration compared to traditional development approaches.

Theses for defence

1. The integration of adaptive property reuse systems in Latvia demonstrates a significant positive impact on the availability and quality of age-friendly social housing, particularly benefiting individuals aged 65 and above.
2. The proposed methodological framework for property reuse creates measurable improvements in housing affordability, sustainability, and accessibility while promoting community integration among older adults.
3. Stakeholder engagement, particularly the involvement of the ageing population in design and planning processes, leads to demonstrably higher levels of resident satisfaction and social cohesion in age-friendly housing developments.
4. The implementation of adaptive property reuse systems in Latvia contributes to more efficient urban land use and enhanced neighbourhood revitalisation compared to traditional development approaches.
5. The study's mixed-methods approach provides empirically validated strategies for implementing successful property reuse systems that address both current housing needs and future demographic challenges.

Several **scientific novelties** were developed in the Doctoral Thesis.

1. *Development of a context-specific methodological framework (Chapter 3).* The methodology has been created that can be used in the future in age-friendly social housing, taking into consideration the peculiarities of the demographic situation of Latvia and focusing on a previously unexplored niche in Latvian housing market. It

is a new framework with its approach considering aspects of affordability, sustainability, energy efficiency, accessibility, resilience and community integration.

2. *Novel framework for property reuse in demographically declining regions (Chapters 2 and 3).* Property reuse for age-friendly social housing works out an evidence-based strategy on property identification and reuse in areas with a declining and ageing population. The framework particularly responds to the issues of adapting existing properties to the requirements of changing demographics in Latvia, a strategy that has not been previously developed in the Baltic context.
3. *First unified framework combining affordability, sustainability, accessibility, and community wellbeing for Latvian age-friendly housing (Chapters 1 and 3).* Before this study, no unified framework existed in Latvian or Baltic housing literature that simultaneously addressed affordability, sustainability, accessibility, and community wellbeing, concepts that are often treated in isolation, into a single comprehensive approach to age-friendly housing development for the ageing population.
4. *Context-specific empirical contributions (Chapter 2).* Empirical information collected on the implementation and impact of age-friendly housing property reuse in Latvia fills a gap not previously addressed in Latvian or comparable Baltic literature and provides information that can inform policymakers and practice in comparable situations.
5. *Development of a systematic assessment framework for demographic transition in Latvia (Chapters 2 and 3).* The new framework addresses the issue of property reuse, which is specifically targeted at the population decline. This contribution provides a systematic approach to solving the housing requirement in areas that undergo ageing and decline, which did not previously exist in the Latvian policy or academic context.

The object of the research is the social housing market in Latvia.

The subject of the research is the property reuse system to develop age-friendly social housing in Latvia.

The theoretical and methodological foundation of the Doctoral Thesis is formed by the following researchers and organisations: Peter A. Bullen, Peter E. D. Love, Craig Langston, Li-Yin Shen, Lukas Veldpaus, John Pendlebury, Ineta Geipele, Antra Kundzina, Rashmi Jaymin Sanchaniya, David B. Hess, Tiit Tammaru, Sandra Treija, Uģis Bratuškins, Zaiga Krišjāne, Ligita Rasnaca, Elina Rezgale-Straidoma, Joost van Hoof, Hannah R. Marston, Jan K. Kazak, Tine Buffel, Chris Phillipson, Paul McGarry, Sarah Handler, M. P. J. Aarts, A. C. Westerlaken, Elena Abolina, Valda A. Luzadis, Ibrahim E. Aigwi, Tutu Egbelakin, John Ingham, Imamul Arief, Hafiz Thahir, Elita Arika, Gunita Mazure, Sara Wilkinson, Ewelina J. Cilliers, Aušra Z. Aydemir, Tugce Akın, Harold Kerzner, Despo Parpas, Andreas Savvides, Fengmei Meng, Yaming Zhi, Yiping Pang, Terry Fulmer, Jason Peine, Richard Oswald, Hans-Werner Wahl, Klaus Gäng, Catherine A. Ottoni, Joanie Sims-Gould, Meghan Winters, M. M. Boerenfijn, L. Schellen, V. Soebarto, Leo W. Baas, F. Boyle, C. Thomson, Walter R. Stahel, Barry Commoner, Francesca Dell'Ovo, Federico Dell'Anna, Rachele Simonelli, Letizia Sdino, James Douglas, Lucia Della Spina, John T. Lyle, Virginia Braun, Victoria Clarke, Robert K. Yin, Robert E. Stake, World Health Organisation (WHO), Organisation for Economic Co-

operation and Development (OECD), European Commission, United Nations (UN), Ellen MacArthur Foundation, Centre for Ageing Better, Central Statistical Bureau of Latvia, Ministry of Economics of Latvia, Ministry of Foreign Affairs of Latvia, Ministry of Welfare of Latvia, Riga Technical University, CECODHAS Housing Europe, Institute for the Study of Labor, American Association of Retired Persons (AARP), National Association of Area Agencies on Ageing, Age Platform Europe, World Bank, International Federation on Ageing, and others.

Literature sources used in the Doctoral Thesis include fundamental scientific studies and monographs on adaptive reuse and social housing, scientific publications in peer-reviewed journals and conference proceedings, sources from scientific databases including Scopus, Web of Science, ScienceDirect, ProQuest, JSTOR, and Google Scholar, laws and regulatory documents of Latvia and the European Union, policy planning documents, European Commission directives, statistical data from Eurostat and the Central Statistical Bureau of Latvia, international organisation reports, including WHO and OECD publications, property reuse case studies, and the author's own research findings.

Research methods used in the Doctoral Thesis include a comprehensive review of the literature, analysis of scientific literature on property reuse and age-friendly housing, mixed methods research design combining quantitative and qualitative approaches, structured questionnaires for stakeholder surveys, statistical analysis including descriptive statistics, correlation analysis and multiple regression analysis, thematic analysis of qualitative data, semi-structured interviews with key stakeholders, case study analysis, triangulation of data sources and methods, expert interviews, document analysis, exploratory factor analysis, cluster analysis for stakeholder perspectives, systematic evaluation of implementation factors, and focus group discussions. The research methodology incorporates both primary data collection through surveys and interviews, and secondary data analysis of policy documents and statistical databases to provide a comprehensive understanding of the implementation of the property reuse system for age-friendly social housing in Latvia.

The scientific significance of the research

The Doctoral Thesis explores sustainable social housing by expanding the discourse through an investigation of adaptive property reuse systems specifically tailored to the Latvian context. The hypothesis posits that implementing a property reuse system will significantly enhance the availability and quality of age-friendly social housing in Latvia. By investigating the perceptions of stakeholders, such as estate agents, real estate businesses, policymakers and the ageing population, this approach provides opportunities for critical reflection on the key factors influencing the development of social housing with a focus on sustainability, affordability and inclusivity. This specifically involves the development of a conceptual framework that integrates the concepts of social sustainability, including social equity, social infrastructure, social capital and social cohesion, to address the pressing demographic challenges and housing needs of Latvia’s ageing population.

The scientific significance of this Doctoral Thesis lies in its multifaceted contributions to theory, methodology and practice in the realms of social geography, urban planning and gerontology. Theoretically, it enriches understanding of the intersections between property

reuse, age-friendly housing and sustainable urban development, particularly in the context of ageing and shrinking populations. It challenges and expands existing models by integrating often siloed concepts of affordability, sustainability, accessibility and community wellbeing into a unified framework.

Methodologically, the Doctoral Thesis advances the application of mixed-methods research in housing studies. By employing quantitative and qualitative methods, such as questionnaires and interviews, this approach demonstrates how technological tools can be harmoniously combined with human-centred methods to produce richer, more nuanced insights. This methodological innovation has broad applicability, not just in housing research but in any field seeking to understand the dimensions of social phenomena.

In terms of empirical contributions, the Doctoral Thesis provides much-needed data on the implementation and effects of property reuse strategies in the context of ageing populations and shrinking cities. Given the global trend of population ageing, these empirical insights have relevance far beyond Latvia, informing housing policies and urban planning strategies in numerous countries grappling with similar demographic shifts.

Moreover, the Doctoral Thesis fosters interdisciplinary dialogue by bridging the focus of urban planning on sustainable and liveable cities with an emphasis on the wellbeing of older adults. This cross-pollination of ideas not only enriches each field but also promotes a more holistic, human-centred approach to addressing complex societal challenges.

Finally, the practical significance of the Doctoral Thesis cannot be overstated. By offering a replicable methodological framework for developing age-friendly social housing through property reuse, it provides a tangible pathway for improving the quality of life for ageing populations while simultaneously promoting urban sustainability. This practical relevance elevates the Doctoral Thesis beyond an academic exercise to a potential catalyst for positive social change.

Practical application of research

The findings and methodological framework developed in this Doctoral Thesis have significant practical applications in addressing the housing needs of an ageing population in Latvia and beyond. First, the research provides a roadmap for policymakers, urban planners and housing providers to implement a property reuse system for age-friendly social housing. By detailing the criteria for identifying suitable properties, design and planning considerations, and implementation strategies, the Doctoral Thesis offers a practical guide for stakeholders seeking to develop affordable, accessible and sustainable housing solutions for older adults.

Furthermore, research has the potential to shape policy decisions at various levels of state administration. The insights gained from the assessment of the current social housing market in Latvia and the analysis of the factors influencing the feasibility of property reuse can help policymakers develop more effective and targeted housing policies. The proposed methodological framework can also serve as a basis for developing national or municipal programmes for the development of age-friendly housing, ensuring that the needs of the older population are prioritised in urban planning and development efforts.

Furthermore, the practical insights offered by the Doctoral Thesis can be applied to other countries facing similar demographic and urban challenges, providing a model for developing sustainable and age-friendly housing solutions in different contexts. Ultimately, by bridging the gap between research and practice, this Doctoral Thesis contributes to the development of more liveable, sustainable and equitable cities for all ages.

In addition, the real-world experience provided by this Doctoral Thesis can be applied to other countries that face similar demographic and urban issues, providing a roadmap to the development of sustainable and age-friendly housing solutions in different settings. This Thesis is effective in closing the gap between research and practice so that cities can be developed into places that are more sensible, livable, and equitable to all age groups.

Limitations of the research. While this Doctoral Thesis offers significant contributions to the fields of social geography, urban planning and gerontology, it is important to acknowledge its limitations. First, the study is geographically limited to Latvia and, more specifically, to the city of Riga. Although the insights gained may have broader applicability, the specific socioeconomic, political and cultural context of Latvia should be considered when attempting to generalise the findings to other settings.

Second, the research relies heavily on the willingness and ability of various stakeholders, including the ageing population, to participate in interviews and focus group discussions. While efforts will be made to ensure a diverse and representative sample, the voluntary nature of participation may introduce some bias.

Third, the research is cross-sectional in nature, providing a snapshot of the current situation and perspectives. However, the needs and preferences of the ageing population, as well as socioeconomic and policy contexts, may evolve. Longitudinal studies are needed to fully understand the long-term impacts and sustainability of the proposed property reuse system.

Fourth, although the research aims to be comprehensive, it cannot exhaustively address all aspects of age-friendly housing and property reuse. For example, the financial viability and investment models for property reuse are not explored in depth, nor are the technical engineering aspects of building renovations for accessibility.

Finally, the research proposes a methodological framework that has been formally validated through a structured three-round Delphi expert evaluation, with pilot implementation designated as a mandatory prerequisite to full-scale rollout based on expert consensus. However, the actual piloting and full-scale implementation have not yet been conducted. Further research is needed to execute the pilot projects, monitor implementation, and assess the real-world impact on the wellbeing of the ageing population and the sustainability of urban development in Latvia.

Despite these limitations, the research provides a valuable foundation for understanding the potential of property reuse for the development of age-friendly social housing and opens avenues for future research and practical applications in Latvia and beyond.

The results of the research were presented at 10 international scientific conferences, in lectures and seminars for students at Riga Technical University, and for experts in the real

estate sector and the Department of Housing Policy (Ministry of Economics of the Republic of Latvia). The formal empirical expert-based assessment of the framework was concurrently conducted through a structured three-round Delphi expert evaluation involving 15 specialists from the state administration authority in the field of economic policy, real estate and academic domains. The results of the research were approbated and confirmed in the focus group and have been published in scientific journals and conference proceedings.

Approbation of Doctoral Thesis in **scientific journal articles.**

1. **Sanchaniya, R. J.**, Ineta, G., Antra, K., and Jurgita, Č. (2026). Age-friendly housing models and frameworks: A systematic review. Real Estate Management and Valuation, 34(2), 45–59. https://doi.org/10.2478/remav-2026-0014
2. **Sanchaniya, R. J.**, Cerneckiene, J., Geipele, I., Kundzina, A., Jansons, L., Pudzis, E., and Drukis, P. (2025). Determinants of Property Reuse for Age-Friendly Social Housing Development in Shrinking and Ageing Cities: Evidence from Latvia. Land, 14(12), 2375. https://doi.org/10.3390/land14122375
3. **Sanchaniya, R. J.**, Geipele, I., Kundziņa, A., and Černeckienė, J. (2025). Key factors and strategies for implementing property reuse systems in age-friendly social housing development. Architecture and Urban Planning, 21(1), 139–150. https://doi.org/10.2478/aup-2025-0011
4. **Sanchaniya, R. J.**, Černeckienė, J., Patel, S., and Kundziņa, A. (2025). Demographic trends and evolving housing needs in Latvia: Implications for social housing policy. Baltic Journal of Real Estate Economics and Construction Management, 13(1), 45–51. https://doi.org/10.2478/bjreecm-2025-0004
5. **Sanchaniya, R. J.**, Černeckienė, J., Gudumasu, S., and Kundziņa, A. (2025). Adaptive property reuse for social housing: Benefits, challenges, and best practices. Baltic Journal of Real Estate Economics and Construction Management, 13(1), 1–9. https://doi.org/10.2478/bjreecm-2025-0001
6. Dobariya, S., **Sanchaniya, R. J.**, and Kundziņa, A. (2024). Regulatory and policy framework for social housing in Latvia: Current state and future directions. Baltic Journal of Real Estate Economics and Construction Management, 12(1), 276–284. https://doi.org/10.2478/bjreecm-2024-0018
7. Oza, B., **Sanchaniya, R. J.**, Kundziņa, A., and Lapuķe, S. (2024). Challenges and barriers to property reuse for social housing: A comprehensive review. Baltic Journal of Real Estate Economics and Construction Management, 12(1), 210–222. https://doi.org/10.2478/bjreecm-2024-0014
8. **Sanchaniya, R. J.**, Sharma, M., and Kundziņa, A. (2024). Social housing models in Latvia and a comparative analysis of the EU member states. Baltic Journal of Real Estate Economics and Construction Management, 12(1), 201–209. https://doi.org/10.2478/bjreecm-2024-0013

Other journal articles on the topic that are not included in the Doctoral Thesis.

1. Welikala, D., Lapuķe, S., Kundziņa, A., Sharma, M., and **Sanchaniya, R. J.** (2025). Energy efficiency trend in the Latvian residential property market. Baltic Journal of Real Estate Economics and Construction Management, 13(1), 91–106. https://doi.org/10.2478/bjreecm-2025-0008
2. **Sanchaniya, R. J.**, and Geipele, I. (2024). Impact of strategic sustainability on real estate industry's sustainability performance. Foundation of Management, 16(1), 59–66. https://doi.org/10.2478/fman-2024-0004
3. **Sanchaniya, R. J.**, Kuruba, K., Kundziņa, A., and Geipele, I. (2024). A model for implementing green building techniques in Indian public sector constructions. Civil and Environmental Engineering, 20(1), 1–12. https://doi.org/10.2478/cee-2024-0017
4. Vanags, J., Jansons, L., Geipele, I., Stāmure, I., and **Sanchaniya, R. J**. (2024). Social dimensions of housing heterogeneity: A pathway to understanding market mechanics and valuation. Real Estate Management and Valuation, 32(3), 1–9. https://doi.org/10.2478/remav-2024-0036
5. **Sanchaniya, R. J.**, Singh, H., Kundziņa, A., Jansons, L., and Naimavičienė, J. (2024). A framework for enhancing project management competency in the construction sector. Baltic Journal of Real Estate Economics and Construction Management, 12(1), 74–88. https://doi.org/10.2478/bjreecm-2024-0005.
6. **Sanchaniya, R. J.**, Machala, J., and Kundziņa, A. (2024). Scaffolding success: A comprehensive analysis of cost management drivers in construction projects. Baltic Journal of Real Estate Economics and Construction Management, 12(1), 138–149. https://doi.org/10.2478/bjreecm-2024-0009.
7. **Sanchaniya, R. J.**, Abdul Siyad Asif, S., and Geipele, I. (2023). Role of real estate management firms toward sustainability in India. Civil and Environmental Engineering, 19(2), 511–519. https://doi.org/10.2478/cee-2023-0046
8. **Sanchaniya, R.J**., Sanchaniya, J.V., and Bhalodi, P. (2023). Comparative analysis of the Indian and Canadian real estate markets. Baltic Journal of Real Estate Economics and Construction Management, 11, 1–13. https://doi.org/10.2478/bjreecm-2023-0001
9. **Sanchaniya, R. J.** (2021). The effect of Covid–19 on the real estate industry in India. Baltic Journal of Real Estate Economics and Construction Management, 9(1), 122–129. https://doi.org/10.2478/bjreecm-2021-0010

Dissemination of the Doctoral Thesis in **international scientific conferences.**

1. **Sanchaniya, R. J.**, Cerneckiene, J., Geipele, I., and Kundziņa, A. (2025). Factors influencing property reuse for age-friendly social housing development: Systematic review. In Proceedings of the 24th International Scientific Conference “Engineering for Rural Development” (Vol. 24, pp. 48-57). Latvia University of Life Sciences and Technologies. https://doi.org/10.22616/ERDev.2025.24.TF011
2. **Sanchaniya, R. J.**, Geipele, I., Kundziņa, A., Černeckienė, J., and Jansons, L. (2025). Adaptive reuse potential (ARP) model for age-friendly social housing: A

systematic literature review. In Environment. Technology. Resources: Proceedings of the 16th International Scientific and Practical Conference (pp. 481–486). RTU Press. https://doi.org/10.17770/etr2025vol1.8624

3. **Sanchaniya, R. J.**, Thomson, D., Kundziņa, A., and Geipele, I. (2024). Effective project management practices in construction industry: Quantitative study. In Proceedings of the 23rd International Scientific Conference “Engineering for Rural Development” (Vol. 23, pp. 85–92). Latvia University of Life Sciences and Technologies. https://doi.org/10.22616/ERDev.2024.23.TF017
4. **Sanchaniya, R. J.**, Kundziņa, A., Thomas, C., Geipele, I., and Naimavičienė, J. (2023). The effect of external and internal factors on management effectiveness within Indian construction companies. In Scientific Problems of Engineering Economics of Construction and Real Estate Management, Regional and Territorial Development ICEREE'2022 (pp. 270–288). RTU Press. https://doi.org/10.2478/bjreecm-2023-0017
5. **Sanchaniya, R. J.**, and Geipele, I. (2023). Identifying existing properties for reuse into social housing. In Proceedings of the 22nd International Scientific Conference “Engineering for Rural Development” (Vol. 22, pp. 100–107). Latvia University of Life Sciences and Technologies. https://doi.org/10.22616/erdev.2023.22.tf018
6. **Sanchaniya, R. J.**, Veluguleti, S., and Geipele, I. (2022). Investment attraction strategies for Indian real estate management firms. In 27th RSEP International Conference on Economics, Finance & Business: Conference Proceedings (pp. 125–136). BC Publishing. https://doi.org/10.19275/RSEPCONFERENCES205
7. **Sanchaniya, R. J.**, and Geipele, I. (2022). Innovative building concepts for social housing development. In Scientific Problems of Engineering Economics of Construction and Real Estate Management, Regional and Territorial Development ICEREE'2022: Book of Abstracts (p. 21). RTU Press.
8. **Sanchaniya, R. J.**, Somrajan, N., & Geipele, I. (2022). Problems and possible solutions of post–disaster housing reconstruction projects in India. In Scientific Problems of Engineering Economics of Construction and Real Estate Management, Regional and Territorial Development ICEREE'2022: Book of Abstracts (p. 16). RTU Press. https://doi.org/10.2478/bjreecm-2023-0004
9. **Sachaniya, R. J.**, and Geipele, I. (2021). Covid-19 post-effect analysis of the Indian real estate industry. In Scientific Problems of Engineering Economics of Construction and Real Estate Management, Regional and Territorial Development ICEREE'2021 (p. 32). RTU Press.
10. **Sanchaniya, R. J.**, and Geipele, I. (2021). The role of entrepreneurship activity in economic development. In Proceedings of the 22nd International Scientific Conference "Economic Science for Rural Development" (pp. 388–395). Latvia University of Life Sciences and Technologies. https://doi.org/10.22616/esrd.2021.55.039

Various research methods and approaches have been used to answer the research questions and achieve the aim of the Doctoral Thesis. As shown in Fig. 1, each stage builds upon the previous one to develop a comprehensive framework for implementing adaptive property reuse in Latvia's social housing sector. This structured approach ensures that the theoretical foundations inform the assessment of key factors which, in turn, guide the development of practical implementation strategies.

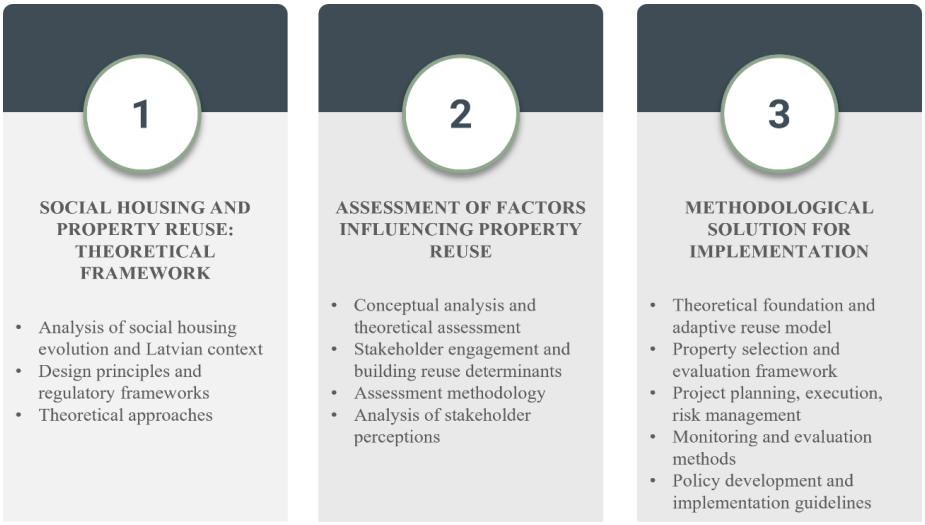

Fig. 1. The structure and methodological framework of the Doctoral Thesis (developed by the author).

Figure 1 illustrates the logical progression and interconnections between the three main chapters of the Doctoral Thesis, demonstrating how each stage builds on previous findings to develop a comprehensive methodological solution.

Content of the Doctoral Thesis

1. SOCIAL HOUSING AND PROPERTY REUSE: THEORETICAL FRAMEWORK

Chapter 1 establishes the theoretical foundation for adaptive reuse of property in developing age-friendly social housing in Latvia. It examines social housing concepts and models across the European Union, analyses Latvia's current housing landscape amid demographic challenges, and explores property reuse principles, benefits, and international case studies that inform the development of a systematic approach to addressing housing needs for the ageing population.

Social housing represents a fundamental welfare component providing affordable housing to individuals unable to meet their housing needs through market mechanisms. Conceptualised as essential infrastructure, social housing supports broader economic and social benefits including improved health, wellbeing, and community cohesion. Within the European Union, social housing is characterised by its mission to serve the general interest, increase affordable housing supply, and focus on vulnerable target groups, though no uniform definition exists across member states (Institute for the Study of Labour, Braga & Palvarini, 2013). The sector is characterised by four key dimensions: tenure arrangements, service providers, beneficiaries, and funding mechanisms, with significant geographical variation in how countries structure and deliver social housing (Sanchaniya et al., 2024). Figure 1.1 categorises EU-27 member states according to these four dimensions, illustrating the diversity of social housing models across Europe despite some common elements in their mission to serve the general interest.

ALLOCATION CRITERIA		SIZE: *Large (> 19 %)*	*Medium (11–19 %)*	*Small (5–10 %)*	*Very small (0–5 %)*
Universalistic		Netherlands, Denmark, Sweden			
Targeted	*Generalist*	Austria	Czechia, France, Finland, Poland	Belgium, Germany, Italy	Slovenia, Luxemburg, Greece
Targeted	*Residual*	UK	France	Belgium, Estonia, Germany, Ireland, Malta	Bulgaria, Cyprus, Hungary, Latvia, Lithuania, Spain

Fig. 1.1. Social housing models in the EU (developed by the author based on Sanchaniya *et al.* (2024)).

The proportion of social housing relative to total housing stock varies dramatically across Europe. The Netherlands, Austria, and Denmark maintain the highest percentages at 32 %, 23 %, and 19 %, respectively, compared to the EU average of 8.3 %. In stark contrast, Eastern and Mediterranean countries typically possess less than 5 % social housing stock, with Latvia having one of the lowest incidences in the EU alongside Greece, as shown in Fig. 1.2. Central and Eastern European countries experienced massive housing privatization following the collapse of socialist systems in the 1990s, resulting in minimal public housing stock.

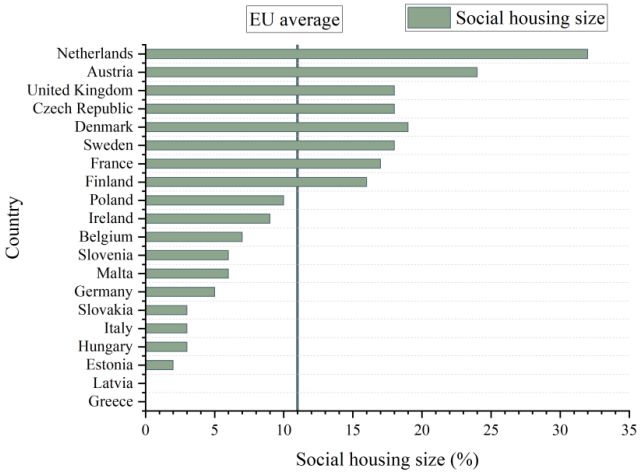

Fig. 1.2. Social housing share of Latvia compared to other EU member states (developed by the author based on Sanchaniya *et al.*, (2024)).

In countries with small social rental housing sectors like Latvia, public authorities often provide and manage the entire stock, whereas countries with larger sectors see significant involvement from nonprofit organizations and cooperative providers (OECD, 2020b). Figure 1.3 illustrates that across OECD countries, the share of social housing in total housing stock ranges from less than 2% in the Czech Republic, Estonia, Latvia, Lithuania, and Luxembourg to more than 20% in Austria and Denmark, reaching up to 38% in the Netherlands.

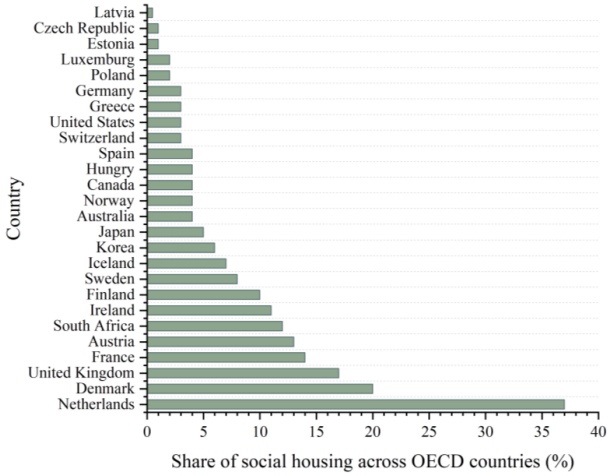

Fig. 1.3. Share of Social Housing Across OECD Countries (developed by the author based on OECD, 2023).

Latvia's social housing landscape is significantly influenced by profound demographic changes. Following independence in 1991, Latvia experienced substantial population decline due to low birth rates, rapid ageing, and high emigration. The population is projected to fall from 1.9 million to approximately 1 million by century's end, with projections indicating a drop below 1.5 million by 2045 (LSM.lv., 2023). Latvia's median age increased to 44 years by 2023, with the proportion of people aged 80+ within the elderly population increasing substantially (Ministry of Welfare of Latvia, 2023). In 2023, only 14 490 children were born, the lowest birth rate in a century (Central Statistical Bureau of Latvia, 2024). High emigration to OECD countries, particularly the United Kingdom, Germany, and Ireland, compounds these challenges. Simultaneously, Latvia has experienced increasing immigration and ethnic diversity, with 24 % of the population being ethnic Russians and 11 % comprising other nationalities, creating distinct housing needs, particularly for affordable social housing (Ministry of Foreign Affairs, 2024).

The existing social housing stock is characterised by large Soviet-era housing estates constructed from the 1950s to 1980s, which now face ageing infrastructure and modernisation challenges. Post-independence privatisation allowed tenants to acquire apartment ownership, resulting in high homeownership rates but leaving the social housing sector with a limited stock of variable quality. Rasnaca and Rezgale-Straidoma (2019) identified significant housing quality differences, with seniors more likely to live in housing lacking basic amenities. Current policies focus on maintaining and upgrading existing social housing while addressing vulnerable groups' needs, though challenges persist, including limited stock concentrated in larger cities, leaving rural populations inadequately served.

Latvia's regulatory framework is grounded in the Constitution's aim to fulfil housing rights for all citizens, especially low-income groups. Strategic goals include improving housing quality and affordability, providing a legal basis for residential building management, creating rented housing stock, and supporting energy-saving measures (Lisa, 2020). Key legislation includes the Law on the Management of Residential Buildings and the Law on Apartment Property, supplemented by regulations covering maintenance requirements and energy efficiency. Despite comprehensive frameworks, challenges remain, including speculative land investments, rural depopulation, and economic factors affecting housing affordability.

Adaptive reuse, or property reuse, involves modifying existing buildings to meet new requirements or improve performance, offering sustainable solutions to housing shortages by repurposing underutilised or obsolete buildings. According to Douglas (2006), building adaptation encompasses “any work to a building beyond maintenance aimed at altering its capacity, function, or performance.” The decision to adapt buildings is often driven by obsolescence encompassing physical condition, economic viability, functional relevance, and environmental factors. Adaptation strategies involve changing the building's function or upgrading existing use to enhance energy efficiency or meet modern standards (Lanz & Pendlebury, 2022).

A fundamental principle of adaptive reuse is the circular economy, which emphasises minimising resource extraction and environmental impact by extending material lifecycles, reducing waste, and promoting reuse and recycling. Foster (2020) proposes a comprehensive

circular economy framework for adaptive reuse that synthesises methods to reduce lifecycle environmental impacts through retrofitting, rehabilitating, and redeveloping buildings while preserving historical and cultural character. Applying circular economy principles can significantly reduce embodied energy, greenhouse gas emissions, fossil fuel consumption, and material use. Social sustainability is enhanced through adaptive reuse projects providing quality affordable housing within historic buildings, supporting mixed-income neighbourhoods, improving accessibility to services, and countering gentrification effects through participatory planning processes (Lanz & Pendlebury, 2022).

The advantages of adaptive reuse are substantial. It contributes to international resource conservation efforts and sustainable practice, reducing greenhouse gas emissions and waste (Langston, 2010). In developed countries, capital expenditure on refurbishment now outweighs new construction in many contexts (Douglas, 2006). Clear economic, environmental, and social benefits make adaptive reuse attractive, potentially obtaining increased floor space ratios and state policy concessions. Lundgren (2023) emphasises social benefits particularly in social housing contexts, noting that adaptive reuse preserves cultural heritage while enhancing social sustainability by revitalising neighbourhoods and improving living standards. Projects can reduce crime and increase social cohesion by optimally utilising underused spaces while maintaining local cultural identity crucial for community belonging. Environmental benefits include resource conservation and waste reduction aligned with broader sustainability goals.

International case studies demonstrate successful implementation. In the United States, Garcia and Kwon (2021) present examples including Minneapolis' proactive brownfield redevelopment policies, Broadway Lofts in Los Angeles benefiting from adaptive reuse ordinances, Santa Ana Arts Collective converting a bank into affordable housing for artists, and Cordell Place in Bethesda encountering less community opposition than new construction. These illustrate that adaptive reuse succeeds with appropriate local policies, economic conditions, and architectural features. Armstrong et al. (2023) note that Dutch regulatory systems provide lower compliance standards for adaptive reuse compared to new development, while Hong Kong demonstrates that effective urban planning frameworks significantly influence adaptive reuse success. Langston et al. (2008) describe successful industrial space conversions in London, Rotterdam, and New York City, with London's Shad Thames area exemplifying economic benefits from warehouse transformations balancing heritage conservation with financial viability.

Despite advantages, property reuse faces challenges. Older adults experience limited mobility, social isolation, and financial constraints, while redevelopment processes must redesign obsolete assets unlikely to face demolition and reconstruction (Bullen & Love, 2011). Architectural and technical barriers pose significant issues for increasingly disabled post-working age populations. Research indicates declining willingness with age to move into mobility-adapted apartments, revealing ambiguity regarding ideal design for older adults (Przybyła et al., 2019).

Age-friendly social housing requires careful attention to design principles ensuring older adult wellbeing and independence. Age-friendly housing encompasses residential environments designed to support health, safety, and wellbeing, being affordable, accessible,

and adaptable, with essential services facilitating community integration and ageing in place (WHO, 2020). As illustrated in Fig. 1.4, the design principles for age-friendly housing integrate multiple dimensions including safety and security, accessibility, affordability, social inclusion, health support, practicality, and sustainability.

Fig. 1.4. Design principles for age-friendly housing (developed by the author).

Universal design principles are integral, creating inherently accessible environments for all people regardless of age or disability, incorporating features like no-step entries, wide doorways, lever handles, and accessible bathrooms (Van Hoof et al., 2019). Safety and security involve physical and technological measures including secure systems, well-lit pathways, and smart home technologies. Social interaction is vital, with communal spaces fostering connections and reducing isolation. Housing should be adaptable to changing needs, located near essential services and amenities, and integrate health and wellness support while incorporating sustainable design features enhancing environmental quality and resident health.

The theoretical framework integrates eight theories through three interconnected layers. Layer 1 (Physical assessment) utilizes building lifecycle and obsolescence theories determining which properties can be reused by assessing structural quality and functional ability. Layer 2 (Transformation process) applies building adaptation and performance theories guiding conversion processes ensuring modern standards and resource efficiency. Layer 3 (Social-environmental integration) employs sustainable development, urban regeneration, social equity, and adaptive reuse theories providing community benefits, environmental sustainability, and social inclusion. This integrated framework addresses the theoretical gap where individual theories do not systematically focus on property reuse for age-friendly social housing within particular welfare settings, creating a unified method specifically oriented toward Latvia's post-socialist context that integrates property reuse strategies with age-friendly design approaches while considering residual welfare system constraints and public resource scarcity.

2. ASSESSMENT OF FACTORS INFLUENCING PROPERTY REUSE FOR SOCIAL HOUSING DEVELOPMENT

Chapter 2 explores the multifaceted aspects of developing age-friendly social housing through property reuse. This chapter delves into the critical factors that influence such initiatives, encompassing social, economic, environmental, and adaptability considerations. By employing a comprehensive stakeholder analysis, the research illuminates the roles and perspectives of various actors involved in the process, from policymakers and developers to the ageing population itself. Through a mixed-methods approach combining quantitative analysis with qualitative insights, this chapter provides a nuanced understanding of the complexities involved in repurposing properties for age-friendly social housing within the Latvian context.

2.1. Stakeholder Engagement and Building Reuse Determinants

The global ageing population presents both significant challenges and opportunities for urban planners and housing developers. As the number of people aged 65 and older is expected to triple by 2050, the demand for age-friendly housing solutions becomes increasingly urgent. Age-friendly housing encompasses more than accessible living spaces; it involves creating environments that support the physical, social, and emotional wellbeing of older adults. The current supply falls significantly short of demand, with a gap between the needed 30 000 units annually and the 8 000 currently being built, highlighting the urgency for increased focus and investment (BDP, 2021).

Stakeholder analysis reveals the critical roles of various actors in developing age-friendly social housing. Effective stakeholder engagement ensures that housing solutions are both practical and reflective of the needs and preferences of older adults. This collaborative approach enhances the relevance and acceptance of housing projects while leveraging diverse expertise and resources (Sturge et al., 2023). Stakeholder analysis typically involves four common steps: clarifying the issue or purpose, identifying stakeholders, determining their relevancy, and working with them to accomplish desired tasks. This structured approach helps systematically identify and assess the relative importance of stakeholders, ensuring their contributions are effectively integrated into projects.

Developing age-friendly social housing requires collaboration among multiple stakeholders, each bringing unique perspectives and resources. Van Hoof et al. (2021) emphasise the crucial role of stakeholders in developing age-friendly social housing, underscoring the significance of collaboration among public, private, and third-sector organisations to create environments that meet the needs of older adults. Building bridges among a range of stakeholders, including multiple levels of state administration and NGOs, is essential for the success of age-friendly initiatives. Table 2.1 presents a comprehensive stakeholder analysis matrix outlining the roles, interests, influences, and engagement strategies of key actors.

Table 2.1

Stakeholder Analysis Matrix (developed by the author)

Stakeholder	Role	Interest	Influence	Engagement strategy
State administration authorities/ policymakers	Create and enforce policies, provide state funding and incentives, ensure compliance with regulatory standards.	Ensure housing meets the needs of ageing population and aligns with broader social and economic policies.	High – can shape the landscape of age-friendly housing through policies and funding.	Collaborate with policymakers, developers, and community organisations; provide state funding and regulatory support.
Real estate developers	Design, construct, and maintain age-friendly housing. Incorporate accessibility, safety, and comfort features.	Develop economically viable and socially beneficial projects, leverage government incentives.	High – critical in implementing age-friendly features and ensuring project feasibility.	Engage with state agencies for incentives and compliance; consult with ageing population for design feedback.
Community organisations	Advocate for the rights and needs of older adults, provide support services, engage in community planning.	Ensure housing solutions reflect the needs and preferences of older adults, promote social inclusion.	Medium – influence policy development and provide essential support services.	Advocate for inclusive policies; provide support and feedback to developers and policymakers.
Ageing population	Provide insights into their needs and preferences, participate in consultations and decision-making processes.	Secure housing that meets their needs, maintain independence and quality of life.	Medium – influence housing design and community planning through participation and feedback.	Participate in consultations and decision-making processes; provide feedback on housing needs and preferences.
International organisations	Provide policy guidance, set global standards, offer best practices, and facilitate funding and technical assistance.	Promote global standards for age-friendly environments, support healthy ageing, and enhance quality of life for older adults.	High – influence global standards and provide resources and support for local initiatives.	Collaborate with local state authorities, developers, and community organisations; provide guidelines, funding, and technical assistance.

State administration authorities and policymakers are pivotal in creating and enforcing policies, providing state funding and incentives, and ensuring regulatory compliance. Their strong influence stems from their ability to shape the landscape of age-friendly housing through

strategic initiatives and support mechanisms. In the European Union, initiatives like the Affordable Housing Initiative under the Renovation Wave strategy aim to double renovation rates, improve energy efficiency, and enhance the quality of life for residents, including older adults (Sengers & Peine, 2021; Eurostat, 2018). State administration involvement is critical in implementing policy frameworks designed to address the specific needs of the ageing population, ensuring that housing is inclusive and supportive.

Real estate developers and contractors are highly influential stakeholders responsible for the design, construction, and maintenance of age-friendly housing projects, ensuring incorporation of essential accessibility, safety, and comfort features. These professionals ensure that the built environment supports healthy ageing by incorporating features that enhance accessibility, safety, and comfort. Innovative design practices are essential, with developers increasingly adopting universal design principles, ensuring housing is accessible to all regardless of age or ability. In Europe, pilot projects have showcased various innovative approaches such as retrofitting existing buildings and incorporating smart home technologies to support independent living (Sengers & Peine, 2021). Developers bring practical knowledge about the feasibility of reusing existing structures, with their insights into construction costs, design adaptability, and market demand highlighting economic and technical factors influencing property reuse.

Successful age-friendly housing development requires collaboration among multiple stakeholders, including developers, state agencies, healthcare providers, community organisations, and residents. By engaging with these stakeholders early in the planning process, developers can ensure that housing meets the diverse needs of older adults and complies with regulatory requirements. This collaborative approach also helps in securing funding and navigating bureaucratic hurdles (Eurostat, 2018; Centre for Ageing Better, 2021). However, developers face several challenges, including increased construction costs from incorporating age-friendly features, navigating complex regulatory landscapes, and addressing market demand uncertainties. Despite these challenges, significant opportunities exist given the growing ageing population, state incentives, and innovations in design, making it easier and more cost-effective to incorporate age-friendly features.

Community organisations and the ageing population provide essential perspectives on social factors. Community organisations advocate for the rights and needs of older adults, provide support services, and engage in community planning, thus influencing policy development and housing solutions. The ageing population is both the primary beneficiary and a critical stakeholder in the development of age-friendly housing, with their needs and preferences guiding planning and implementation. Community groups representing older adults provide valuable insights into the most important features and services (Centre for Ageing Better, 2021).

Active engagement and participation of the ageing population in planning and development processes is essential. By involving older adults in consultations and decision-making processes, developers and policymakers gain a deeper understanding of their preferences and needs. This participatory approach not only improves the relevance and quality of housing solutions but also empowers older adults, fostering a sense of agency and

community ownership (McGarry, 2018). Techniques such as participatory design workshops and focus groups allow residents to voice their preferences and concerns. Their feedback ensures that reused properties meet specific needs such as accessibility, safety, and social connectivity, helping identify social acceptance and public perception issues crucial for project success.

International organisations such as the World Health Organisation (WHO) and the European Union provide essential policy guidance and set global standards for age-friendly environments. The policy frameworks and models developed by these international bodies often include best practices and evidence-based guidelines, helping local state authorities and developers implement effective age-friendly housing solutions. Engaging with these organisations can enhance the credibility and visibility of local projects, attracting further support and investment.

The stakeholder analysis not only clarified the roles and influences of key actors but also uncovered a wide range of factors – social, environmental, economic, and adaptability – that are vital for successful reuse of properties for age-friendly social housing. Figure 2.1 illustrates the critical demographic and societal factors influencing age-appropriate housing development. The "second demographic transition" catalysed profound societal changes since the 1960s, reshaping various aspects of life across many countries. Key outcomes include increased migration, diversified household structures, and notably, an ageing population due to longer lifespans and lower birth rates. This demographic shift holds substantial implications for market sectors such as healthcare, real estate, technology, and financial services.

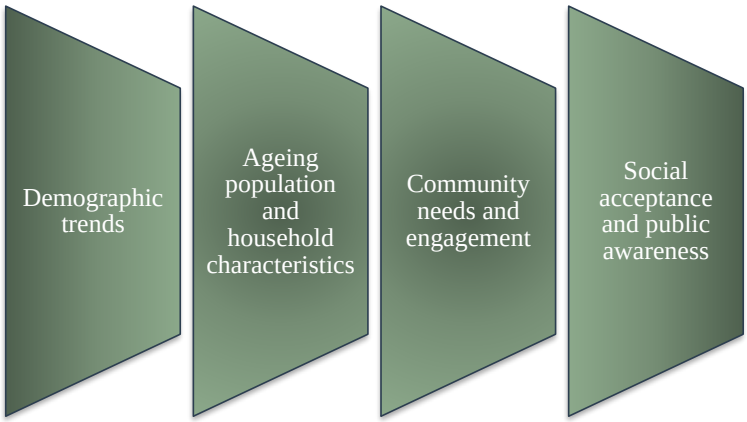

Fig. 2.1. Analysis of key demographic and social factors affecting age-appropriate housing initiatives (developed by the author).

Social factors significantly influence the design, implementation, and success of age-friendly social housing initiatives. The characteristics of the ageing population, including their diverse needs and preferences, must be central to housing design. Community involvement and social connectivity are crucial, as they help reduce isolation and foster a sense of belonging among older adults. The importance of familiar surroundings and a strong sense of community

significantly enhances a city's age-friendliness and contributes to older adults' reluctance to relocate. Housing preferences are influenced not only by urban versus rural price levels but also by social networks, making it essential to offer a variety of housing options within neighbourhoods to accommodate changing needs (WHO, 2007). Innovative housing types such as co-housing and group living can provide both shelter and social interaction for older adults (van Hoof & Boerenfijn, 2018).

Economic factors play a critical role in determining the feasibility of property reuse for social housing. Development costs, including expenses for retrofitting and modernisation, must be carefully managed to ensure projects remain financially viable. Financing options such as state subsidies, tax incentives, and private investment are essential for supporting these initiatives. Property reuse can be cost-effective by circumventing expenses associated with demolition and new construction (Langston, 2012). Moreover, maintaining heritage buildings can enhance property values and attract investment, fostering economic vitality within communities. Reusing existing buildings is often more economical than constructing new ones, as it reduces the need for new materials and labour costs, with adaptive reuse projects tending to be completed more quickly, making them attractive options for social housing developers.

Environmental factors focus on sustainability and energy efficiency, which are paramount in modern housing development. The reuse of existing buildings minimises the need for new construction materials, thereby reducing carbon footprint and resource consumption (Bullen and Love, 2011). Adaptive reuse can decrease waste generation and promote conservation of embodied energy within the existing structure. Using sustainable materials and construction techniques is essential in minimising environmental footprint of age-friendly social housing. Recent research in the EU highlights the benefits of using materials with low environmental impact, such as recycled steel, reclaimed wood, and eco-friendly concrete. These materials not only reduce waste but also enhance durability and energy efficiency of buildings. Adopting construction techniques that minimise resource use and waste generation, such as modular construction and prefabrication, can significantly reduce environmental impact.

Adaptability considerations ensure that housing can meet changing needs of residents over time. Flexible design principles allow for easy modifications as residents' abilities change, supporting ageing in place. This includes incorporating universal design features accessible to people of all ages and abilities. Proximity to essential services and amenities is crucial, with housing located near healthcare facilities, public transport, shops, and recreational areas significantly improving quality of life for older adults. Ensuring housing is in walkable neighbourhoods with accessible public transport makes it easier for residents to maintain independence and participate in community activities (Van Hoof et al., 2019).

The concept of age-friendly smart ecologies (CASE) framework proposed by Marston et al. (2020) integrates various outer and inner spheres related to sustainability, environmental, and accessibility factors, with technology prominently featured within inner quadrants reflecting its interconnected role. Figure 2.2 illustrates this framework, unique in its potential to represent a district or suburb within a city or town.

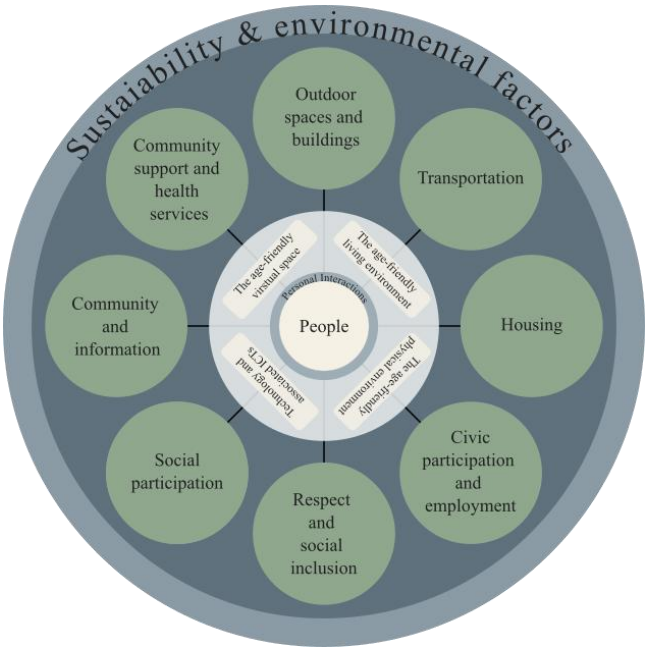

Fig. 2.2. The CASE framework (developed by the author based on Marston et al. (2020)).

The eight centrally located hubs within the framework vary in size based on positive and negative impacts specific to the district. For instance, well-connected public transport and well-represented services are depicted by a large circle, whereas poorly supported community support and health services are illustrated by a smaller circle.

2.2. Methodology and Factor Assessment Analysis

The comprehensive assessment of factors influencing property reuse for age-friendly social housing employed a mixed-methods research design, combining quantitative and qualitative approaches to ensure robust findings. The research was divided into two main phases: secondary data analysis through a comprehensive literature review and primary data collection through structured questionnaires and interviews. This multimethod approach allowed for triangulation of findings and provided a solid foundation for policy recommendations (Carter et al., 2014).

A case study approach was employed to thoroughly investigate the practical implementation of property reuse systems for developing age-friendly social housing in Latvia. This method was chosen for several reasons: it provides contextual understanding by examining specific instances of property reuse projects, allows for comprehensive exploration of multifaceted aspects including legal, economic, social, and environmental dimensions, and facilitates collection of rich, detailed data from real-world examples, ensuring research findings are grounded in practical experience rather than purely theoretical constructs. This approach

facilitated the collection of nuanced data from specific instances of property reuse projects, providing rich context for understanding how such systems can be designed and implemented in Latvia.

The primary data collection instrument was a detailed structured questionnaire developed through insights from an extensive literature review (Van Hoof and Boerenfijn, 2018; WHO, 2007). The questionnaire comprised three parts: a demographic section collecting information on participants' age, gender, occupation, location, and years of experience; a quantitative section consisting of 40 closed-ended items rated on a 5-point Likert scale measuring attitudes, perceptions, and satisfaction levels regarding various aspects of property reuse for age-friendly housing; and a qualitative section including 15 open-ended questions gaining deeper insights into respondents' personal experiences and suggestions. The questionnaire was structured around key domains including accessibility and design features, safety and security, community and social engagement opportunities, affordability and economic considerations, environmental sustainability, and regulatory compliance.

The target population included elderly residents currently living in social housing, potential elderly residents, housing authorities and policymakers, and developers and architects specialising in age-friendly designs. A stratified random sampling technique was used to ensure representation across different demographics and regions. The questionnaire was distributed through multiple channels, including online platforms, postal mail, and in-person at community centres and housing facilities. The sample comprised 50 stakeholders evenly divided between state administration officials (n = 25) and real estate professionals (n = 25), representing organisations primarily from Valmiera and Vidzeme regions. Participants had diverse experience levels, with the majority being highly experienced (16–20 year s: n =12; 26+ years: n = 13), suggesting a sample with substantial expertise and varied responsibilities.

Quantitative data analysis employed several statistical methods using the Python programming language. Descriptive statistics including frequency distributions, means, and standard deviations summarised responses for each Likert-scale question, helping identify general tendencies and variability in opinions among respondents. Correlation analysis explored relationships between different factors influencing site selection, design considerations, and implementation strategies, revealing how strongly factors are associated with each other. Multiple regression analysis examined how the proposed property reuse system predicts outcomes related to affordability, sustainability, energy efficiency, accessibility, resilience, and community integration, with independent variables including aspects from site selection, environmental considerations, and design principles.

The descriptive statistics provided a comprehensive summary of the data, including demographic information and measures of central tendency. Mean values across different factor categories indicated generally positive attitudes toward property reuse for age-friendly social housing, with most factors receiving mean scores above 3.5 on the 5-point scale, suggesting moderate to strong agreement among stakeholders regarding the importance and feasibility of various implementation aspects.

Correlation analysis was performed to understand the relationships between various factors influencing property reuse for age-friendly social housing. The correlation heatmap

revealed important patterns. Positive correlations existed particularly within the same category (e.g., environmental factors or economic factors), suggesting that variables within the same group tend to move together. Positive correlations between different groups, such as between environmental factors and economic factors, indicated that improvements in one aspect (e.g., sustainability) might positively influence another (e.g., economic feasibility). While some slight negative correlations existed, none were very strong, suggesting that certain improvements in one area could slightly reduce outcomes in another, though these effects appeared minimal. The relationships between different categories such as economic factors and social factors, or environmental factors and challenges/barriers, helped identify which areas of focus might simultaneously improve multiple outcomes. Understanding these correlations helped in prioritising interventions with the most significant overall impact, as improving environmental factors (like energy efficiency) could positively influence both economic and social outcomes.

Multiple linear regression was employed to model and understand relationships between dependent variables (such as social factors including community participation and social cohesion) and multiple independent variables (economic factors, environmental factors, and spatial design factors). The regression model is expressed as

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + \varepsilon,$$

where Y represents the dependent variable, β_0 is the intercept, β_1 through β_n are coefficients associated with each independent variable X_1 through X_n, and ε denotes the error term.

The multiple regression analysis emphasised the role of economic factors, particularly availability of financing options and impact of development costs, which were significant predictors of social outcomes, indicating that addressing economic challenges is vital for enhancing community participation and social cohesion. Environmental factors like energy efficiency and integration of renewable energy sources were found to mitigate challenges and improve feasibility and overall project impact. R-squared values provided an indication of how well models explained variability in dependent variables, with significant predictors identified based on their coefficients and p-values, shedding light on their roles in influencing outcomes.

Exploratory factor analysis was conducted to identify underlying dimensions within the dataset, revealing six major factors representing crucial dimensions of the implementation process. These factors emerged from analysis of 28 questions, with factor loadings indicating strength and direction of relationships between each question and identified factors. Factor 1 (Site selection) emphasised proximity to amenities, transportation accessibility, environmental impact, and socioeconomic benefits. Factor 2 (Feasibility analysis) focused on structural integrity, cost-benefit analysis, and legal and zoning considerations, though it showed lower reliability scores suggesting questions grouped under this factor may require further refinement. Factor 3 (Design and planning considerations) highlighted universal design, accessibility modifications, community spaces, and neighbourhood connectivity. Factor 4 (Implementation strategies) encompassed stakeholder engagement, understanding regulations, detailed planning, and risk management, with both Factors 3 and 4 showing the highest reliability scores, indicating questions grouped under these factors consistently measure the

same underlying construct. Factor 5 (Monitoring and evaluation) included KPIs, baseline measurements, feedback loops, and ongoing improvements. Factor 6 (Scaling strategies) addressed supportive policies, regulatory frameworks, diverse funding sources, and incentive programs.

Cluster analysis was performed to segment respondents into distinct groups based on their responses, identifying three clusters each with unique priorities. Cluster 1 showed high engagement in site selection and feasibility analysis, suggesting this group prioritises fundamental assessment aspects. Cluster 2 emphasised implementation strategies and monitoring, indicating focus on robust execution and evaluation processes. Cluster 3 prioritised design and scaling strategies, demonstrating engagement with long-term sustainability and scalability concerns. These distinct stakeholder perspectives revealed the importance of tailoring engagement strategies to different groups' specific priorities, ensuring more effective and cohesive project execution.

Qualitative data analysis employed thematic analysis to interpret data from open-ended questionnaire responses and interview transcripts. Thematic analysis, as described by Braun and Clarke (2006), involves a systematic process of coding qualitative data to generate significant themes, providing a deeper understanding of the research topic. This method was chosen for its flexibility across theoretical frameworks and research questions, ability to provide rich, detailed descriptions uncovering insights deeply embedded in participants' experiences and perspectives, systematic pattern identification helping to uncover key themes informing age-friendly social housing development, and structured approach to moving from raw data to meaningful interpretations ensuring findings are both data-driven and theoretically informed.

Several key themes emerged from qualitative analysis. Economic and financial constraints emerged as a dominant theme, with respondents frequently mentioning difficulty in securing long-term funding and managing high construction costs, aligning with quantitative data's emphasis on economic barriers. Sustainability and energy efficiency were highlighted as essential for ensuring long-term success and affordability of housing projects, corroborating regression analysis results. Active engagement and consultation themes emphasised importance of involving older adults in public consultations, forming advisory committees with senior representation, and ensuring housing designs are adaptable and close to essential services. Regulatory and legal challenges emerged as significant barriers, with navigating complex regulatory and legal frameworks identified as a major challenge in the property reuse process. Market trends and demographic changes were recognised as key factors driving demand for age-friendly housing, particularly the need for proximity to essential amenities.

Triangulation of quantitative and qualitative findings provided a robust understanding of key factors influencing feasibility and success of age-friendly social housing in Latvia and how ageing population perspectives can be effectively incorporated. For Research Question 1 concerning designing and implementing a property reuse system, descriptive statistics revealed general agreement among stakeholders on the importance of various factors, while correlation analysis showed interconnectedness of factors, suggesting that addressing one factor positively influences others. Qualitative analysis highlighted themes such as community engagement,

sustainability, and regulatory compliance as central to successful implementation, indicating that holistic approach considering multiple dimensions is essential for an effective property reuse system.

For Research Question 2 regarding key factors influencing feasibility and success, descriptive and correlation analyses indicated that economic factors (development costs and financing options), environmental factors (energy efficiency and sustainable materials), and social factors (community participation and accessibility) are highly significant. Multiple regression analysis emphasised role of economic factors, particularly the availability of financing options and the impact of development costs as significant predictors of social outcomes. Qualitative analysis supported these findings by identifying themes such as economic and financial constraints, market trends, and sustainability as critical to project feasibility.

For Research Question 3 concerning effective incorporation of ageing population perspectives, descriptive statistics indicated social factors, such as community engagement and accessibility to services, are highly valued by respondents. Multiple regression analysis identified specific features and services, particularly accessibility of sidewalks, as significant predictors of social outcomes, highlighting the importance of designing housing that is physically accessible and well-integrated with existing community infrastructure. Qualitative analysis emphasised importance of involving older adults in public consultations, forming advisory committees with senior representation, and ensuring housing designs are adaptable and close to essential services, underscoring the need for a participatory approach and integration of universal design principles to create age-friendly environments.

Building on this triangulation of findings, Fig. 2.3 presents an integrated conceptual framework that synthesises the multidimensional factors influencing property reuse for the development of age-friendly social housing. This framework illustrates the interconnection of six critical dimensions identified through research: social factors, environmental factors, adaptability, economic factors, challenges and barriers, and stakeholder engagement. At the centre lies the core concept of property reuse for age-friendly social housing, surrounded by these dimensions that collectively determine its feasibility and success. The outer ring details specific elements within each dimension that emerged as significant through both statistical analysis and qualitative assessment. The framework also acknowledges key stakeholder groups whose collaborative engagement is essential for implementation. This holistic representation serves as a foundation for the methodological solution presented in Chapter 3, which translates these interconnected factors into practical implementation strategies to develop sustainable, inclusive, and responsive age-friendly social housing in Latvia.

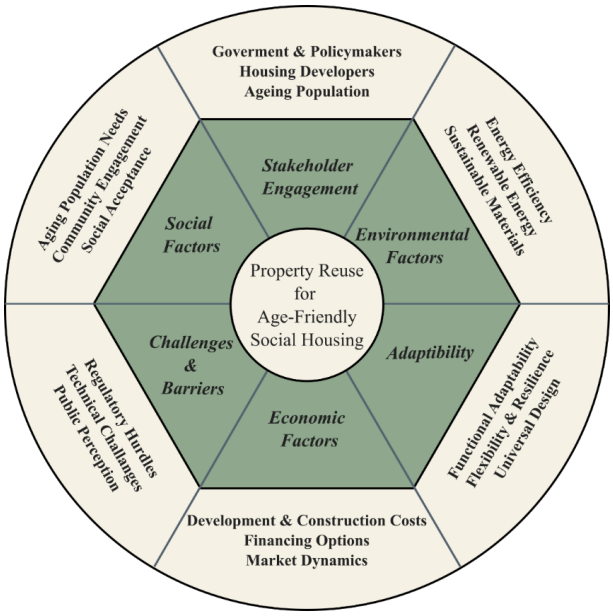

Fig. 2.3. Conceptual framework for property reuse in age-friendly social housing development (developed by the author).

Key findings from the comprehensive analysis demonstrate several critical success factors. Economic viability emerged as paramount, with availability of financing options, management of development costs, and securing long-term funding identified as crucial for project feasibility. Stakeholders emphasised that adaptive reuse can be cost-effective by reducing expenses associated with new construction while potentially enhancing property values and attracting investment. Environmental sustainability proved essential, with energy efficiency, use of sustainable materials, and integration of renewable energy sources identified as critical factors mitigating challenges and improving project feasibility. The reuse of existing buildings minimises environmental footprint while promoting conservation of embodied energy, aligning with broader sustainability goals.

Social integration and community engagement emerged as vital components, with active involvement of ageing population in consultations and decision-making processes essential for developing relevant housing solutions. Community participation, accessibility to services, and creation of communal spaces fostering social connections were identified as significant predictors of project success. Strategic site selection considering proximity to essential services, amenities, and transportation accessibility proved vital for creating functional and supportive living environments. Well-integrated sites equipped with necessary infrastructure enhance resident wellbeing and project success.

Regulatory and policy support requires strong frameworks including clear policies, state incentives, and streamlined regulatory processes to facilitate property reuse. Navigating complex regulatory and legal frameworks emerged as a significant challenge requiring

advocacy for supportive policies and frameworks. Tailored implementation strategies must address specific needs and priorities of different stakeholder groups, with recognition of diverse perspectives ensuring more effective and cohesive execution. This includes stakeholder engagement, detailed planning, and risk management to align all stakeholders with project goals.

This chapter explored critical factors influencing reuse of properties for developing age-friendly social housing, emphasising importance of stakeholder engagement, economic considerations, and market dynamics in creating sustainable, inclusive, and responsive housing solutions for older adults. The mixed-methods approach combining quantitative and qualitative analysis provided a comprehensive understanding of multifaceted relationships, impacting the implementation of property reuse systems. The findings demonstrate that successful implementation requires an integrated approach addressing economic viability, environmental sustainability, social integration, strategic site selection, regulatory support, and tailored implementation strategies. The assessment framework presented in this chapter provides a foundation for understanding complex factors influencing property reuse for social housing, setting the stage for the methodological solution presented in Chapter 3, which translates these findings into practical implementation strategies for adaptive reuse

3. METHODOLOGICAL SOLUTION FOR IMPLEMENTING PROPERTY REUSE SYSTEM FOR THE DEVELOPMENT OF THE SOCIAL HOUSING

Building on the critical factors identified in Chapter 2, this chapter presents a structured methodological approach for implementing adaptive property reuse systems for the development of age-friendly social housing in Latvia. The entrepreneurial landscape continuously evolves, necessitating that decisions related to adaptive property reuse be analysed from multiple perspectives: state policymakers, real estate businesses, the elderly population, and the broader impact of economic, social, environmental, political, legal, and technological factors. The methodological framework presented fulfils the Doctoral Thesis aim by providing a comprehensive system to implement property reuse that promotes affordable, sustainable, age-friendly social housing in Latvia while addressing the housing needs of the country's ageing population.

The methodological solution directly responds to essential considerations found through empirical analysis in Chapter 2. Three complementary models were selected based on information about six critical dimensions (as identified in Fig. 2.3 of Chapter 2) and stakeholder priorities. These models function synergistically: the adaptive reuse potential (ARP) model addresses property assessment needs by evaluating seven obsolescence variables; the adaptive reuse decision-making model guides demolition versus reuse decisions based on feasibility factors; and the four-phase methodological process integrates all factors into a systematic implementation approach. This unified methodology responds to the complexity revealed in the cluster analysis from Chapter 2, which illustrated three distinct stakeholder groups requiring different engagement methods. The following sections detail these components and provide guidance for their implementation in the Latvian context.

3.1. Adaptive Reuse Models and Property Evaluation Framework

Theoretical Foundation and Adaptive Reuse Models

The concept of adaptive property reuse, traditionally applied to historic buildings, can be innovatively adapted to address the growing demand for social housing by repurposing existing structures for new uses while retaining valuable features. This approach begins with assessing building potential using specialised evaluation frameworks that consider physical, economic, functional, technological, social, legal, and political characteristics. Community engagement and planning are crucial to align projects with local needs and ensure public support (Mérai et al., 2022), while sustainable design principles such as structural integrity, material durability, flexibility, convertibility, and energy efficiency enhance long-term usability and environmental impact. Navigating legal and regulatory frameworks remains essential for compliance and approval, while economic feasibility studies ensure financial viability, often supported through public-private partnerships and grants. By applying these principles, cities can convert underutilised properties into affordable social housing, addressing

shortages and promoting sustainability while preserving cultural heritage (Sanchaniya and Geipele, 2023).

Existing buildings that are obsolete or nearing neglect, potentially facing demolition, represent a valuable reservoir of materials for future projects. Building upon the theory of "urban ores", which posits that neglected structures contain raw materials akin to mines, adaptive reuse offers a more effective solution compared to simple material recovery. Rather than dismantling and recycling basic materials, a more efficient approach involves preserving the building's fundamental structure and fabric while repurposing its use (Shen & Langston, 2010).

The adaptive reuse potential (ARP) model, developed by Langston and Shen (2007), provides a comprehensive framework for evaluating the potential of existing buildings for adaptive reuse. This model serves as a systematic framework for evaluating and quantifying reuse potential, with particular value in its ability to integrate multiple assessment criteria. By considering factors such as physical condition, economic viability, functional adaptability, and social value, the ARP model enables a holistic assessment that aligns with the complex requirements of age-friendly social housing development. The model identifies and ranks the potential for adaptive reuse in existing buildings, serving as an intervention strategy to maximise collective social value and plan for future redundancy (Shen & Langston, 2010).

The model involves calculating two main values: a building's useful life (Lu) and its adaptive reuse potential (ARP). The useful life of a building represents the optimal point in its lifespan for repurposing, when the building has the highest potential for reuse (Lacson, 2023). To determine this, assessors must estimate the building's physical life (L_p) – an estimated value representing how long the building is expected to last physically, typically assigned values of 100 years or less for modern buildings, though values of 150 and 200 years can also be used – and the building's age (L_b), the number of years from construction to the current year or year of assessment. According to the model, the adaptive reuse potential reaches its peak at Lu and then declines to zero as the building ages towards its physical life. This relationship is illustrated through a decay curve model (see Fig. 3.1), where the ARP score starts at zero, reaches its maximum at the building's useful life, and then declines back to zero as it approaches its physical life.

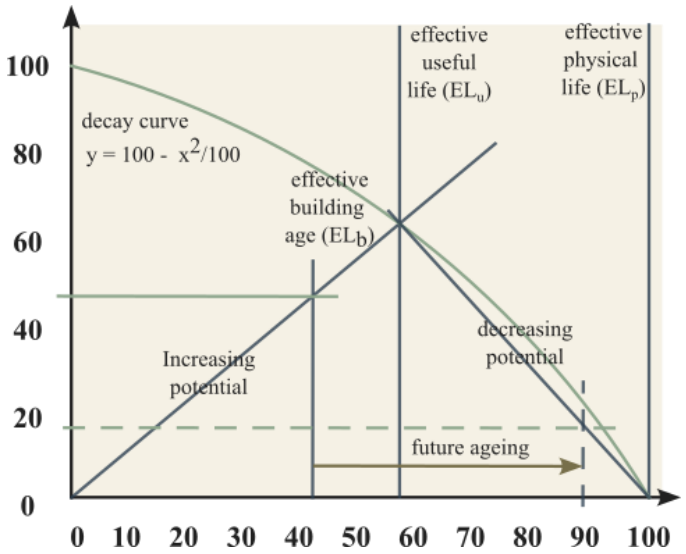

Fig. 3.1. Adaptive reuse potential model (developed by the author based on Langston, 2008).

To determine the ARP score, the model requires assessment of seven obsolescence variables, expressed as percentages typically ranging from 0 % to 20 % (Langston & Shen, 2007; Remøy, & Langston, 2014). These variables encompass physical, economic, functional, technological, social, legal, and political factors, each evaluated independently. As detailed in Table 3.2 of the Thesis, the seven obsolescence variables are: (1) physical obsolescence – wear and tear based on maintenance policy, rated from 0 % for high maintenance budget to 20 % maximum; (2) economic obsolescence – value influenced by the building's location, rated from 0 % for high density location to 20 % maximum; (3) functional obsolescence – degree to which the building meets current functional requirements, rated from 0 % for high adaptability to 20 % maximum; (4) technological obsolescence – building's capacity to accommodate modern systems and technologies, rated from 0 % for high energy efficiency to 20 % maximum; (5) social obsolescence – building's alignment with current social preferences and community needs, rated from 0 % for high market relevance to 20 % maximum; (6) legal obsolescence – compliance with current building codes and regulations, rated from 0 % for high compliance to 20 % maximum; and (7) political obsolescence – degree of public interest and support for preservation, rated from 0 % for high public interest to 20 % maximum.

The methodology helps assessors determine the optimal time for repurposing a building, ensuring reuse decisions are made when the building's potential is highest. Key assumptions include: high obsolescence results in shorter useful building life while low obsolescence extends it; when all obsolescence factors decrease to 0 %, the building's useful life equals its physical life but the reuse potential drops to zero; when all obsolescence factors reach the suggested maximum of 20 %, the useful life is approximately 20 % of the physical life; and when all obsolescence factors increase to 100 %, the useful life drops to 0 years and the ARP score rises to 100 %. Maintaining low obsolescence values through proper upkeep,

ideal location, adaptability, energy efficiency, market relevance, compliance, and positive public interest extends a building's useful life and maximises its reuse potential.

The ARP model facilitates a shift in traditional property stakeholder decision-making processes toward more sustainable practices and outcomes. By identifying and ranking existing buildings with significant potential for adaptive reuse, the model enables the industry to embrace sustainable development strategies (Langston et al., 2008). The model plays a crucial role in transforming obsolete buildings, offering a sustainable alternative to the resource-intensive practices of demolition and redevelopment (Langston, 2011, 2012). Moreover, the ARP model contributes to reducing environmental impact through decreased material consumption and waste generation, preserving cultural heritage and historical significance by conserving existing structures, and enhancing economic efficiency by minimising costs associated with new construction (Dyson et al., 2016). These benefits underscore the model's significance in promoting sustainability and efficient resource management in the built environment.

The adaptive reuse decision-making model developed by Bullen and Love (2011) is designed to aid practitioners in deciding whether to reuse or demolish existing buildings. As illustrated in Fig. 3.2, this model offers a comprehensive framework for evaluating whether existing buildings should be repurposed or demolished, integrating critical factors that influence decision-making. It starts with the financial considerations of capital investment and meticulously assesses the asset's condition, encompassing structural integrity and regulatory compliance, ensuring that adaptive reuse projects meet safety and legal standards. Regulatory requirements, including zoning and environmental regulations, are pivotal in shaping project feasibility and timelines.

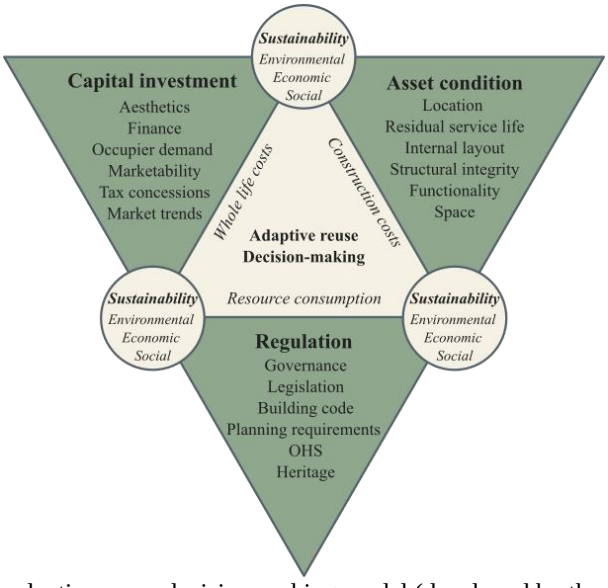

Fig. 3.2. The adaptive reuse decision-making model (developed by the author based on Bullen and Love (2011)).

Moreover, the model underscores sustainability principles across environmental, economic, and social dimensions. Environmentally, it highlights benefits like reduced construction waste and enhanced energy efficiency from reusing existing structures. Economically, the model evaluates lifecycle costs and potential revenue streams from adaptive reuse, weighing these against the costs of new construction. Socially, it considers community impacts such as cultural heritage preservation and neighbourhood revitalisation, emphasising adaptive reuse's role in fostering sustainable urban development. Through this framework, Bullen and Love visually articulate how these factors interconnect within a decision-making process, guiding stakeholders to make informed choices that align with sustainability goals and local community needs. By emphasising the holistic benefits of adaptive reuse over demolition, the model promotes responsible urban development practices while preserving architectural heritage and reducing environmental footprint.

After extensive review of several models including the green adaptive reuse model, the adaptive sustainable reuse model, the sustainable-driven adaptive reuse model, and the improved entropy TOPSIS method, Langston and Shen's adaptive reuse potential model was selected for application in this Doctoral Thesis. This decision was based on the widespread application and recognised effectiveness of the ARP model in assessing the feasibility and potential success of converting existing buildings for new purposes, particularly housing. The model's comprehensive framework provides a systematic approach to determining whether a building can be successfully adapted for new uses while taking into account various factors such as structural integrity, historical significance, and environmental impact. The ARP model's broad acceptance and proven track record make it an ideal choice for evaluating adaptive reuse projects in the Latvian context.

Property Selection and Evaluation Framework

Several factors influence the selection of sites for age-friendly social housing developments, while the potential for property reuse deserves careful consideration. Primary determinants include location and zoning regulations, community integration opportunities, and security considerations. Additionally, environmental and socioeconomic factors, land-use compatibility, and alignment with urban planning objectives merit thorough examination. The selection process requires a comprehensive evaluation of these interconnected elements to ensure optimal outcomes for both residents and the broader community. Each factor contributes distinctively to the success of the development, requiring meticulous analysis and strategic planning throughout the site selection process. Integration of these considerations facilitates the creation of sustainable, age-appropriate housing solutions that serve the needs of elderly residents while fostering community cohesion, ensuring long-term viability and positive societal impact. Figure 3.3 illustrates the essential criteria for site selection in age-friendly social housing development.

Fig. 3.3. Site selection criteria for age-friendly social housing development (developed by the author).

Location and zoning considerations are paramount in site selection for adaptive reuse projects. Heritage professionals must adopt a broader perspective to evaluate numerous heritage sites that could benefit from adaptive reuse. Given limited resources and the multitude of potential sites, prioritisation becomes essential for professionals and stakeholders. Community integration emerges as a critical factor, requiring careful assessment of how proposed housing developments will connect with existing neighbourhoods and services. The proximity to essential amenities, including healthcare facilities, shopping centres, public transportation, and recreational spaces, significantly influences the suitability of a site for age-friendly housing development.

Safety and security considerations must be thoroughly evaluated, encompassing both the physical security of the property and the broader neighbourhood safety context. Environmental considerations play an increasingly important role in site selection, with emphasis on assessing the environmental impact of proposed developments, opportunities for sustainable design integration, and the site's vulnerability to environmental risks such as flooding or extreme weather events. Land use compatibility requires examination to ensure that proposed housing developments align with existing land use patterns and municipal planning objectives, while also considering the potential for mixed-use development that can enhance community vitality.

Urban planning goals and alignment with broader city development strategies must inform site selection decisions. Energy and water efficiency potential of sites should be evaluated, considering factors such as solar orientation, access to district heating systems, and water management infrastructure. The selection criteria emphasise the importance of choosing locations that not only meet immediate housing needs but also contribute to sustainable urban development and enhance the quality of life for residents.

The evaluation of properties for adaptive reuse requires a systematic approach that considers multiple dimensions of building assessment. Structural integrity assessments are crucial for property reuse projects, requiring thorough inspection of building foundations, load-bearing structures, and overall structural soundness. The assessment must determine whether existing structures can support the modifications necessary for age-friendly housing conversion while meeting current building codes and safety standards.

Economic feasibility analysis forms another critical component of property evaluation. Conducting thorough cost-benefit analysis is necessary before proceeding with any project, encompassing renovation costs, ongoing maintenance expenses, and potential revenue streams. The analysis must consider both immediate financial requirements and long-term economic viability, ensuring that projects remain sustainable throughout their operational life. Economic evaluation also requires assessment of funding sources, potential subsidies, and partnership opportunities that can enhance project feasibility.

Legal and zoning considerations constitute a major part of property evaluation, requiring careful examination of existing zoning regulations, building codes, and heritage protection requirements. Properties under consideration must be evaluated for compliance with current regulations or the feasibility of obtaining necessary variances and approvals. Legal assessment includes review of property ownership structures, existing liens or encumbrances, and any legal restrictions that might affect property conversion.

The application of the ARP model to property evaluation provides a structured approach to quantifying reuse potential. By assessing the seven obsolescence variables, stakeholders can systematically evaluate whether a property represents a viable candidate for adaptive reuse. Buildings with ARP scores above 50 % demonstrate high adaptive reuse potential, scores between 20 % and 50 % indicate moderate potential, and scores below 20 % suggest low potential for successful conversion. This quantitative assessment enables stakeholders to prioritise properties based on objective criteria while considering the unique characteristics of each building and its context.

3.2. Implementation Strategies and Policy Development

Implementation Framework and Strategic Planning

The implementation of a property reuse system for age-friendly social housing requires a comprehensive framework that addresses multiple dimensions of project execution. The proposed methodological solution is built on six core principles that emerged from the empirical findings in Chapter 2 and guide the practical implementation of adaptive reuse projects in Latvia.

Financial and economic planning constitutes the first foundational principle, requiring strategies to secure diverse funding sources and manage costs effectively to ensure long-term viability and affordability. This principle emphasises the importance of developing robust financial models that account for both initial capital investment and ongoing operational costs,

while identifying multiple revenue streams and funding mechanisms that can sustain projects over time.

Environmental integration represents the second principle, requiring incorporation of sustainability and energy efficiency at all stages to reduce costs and enhance environmental impact. This principle mandates the integration of green technologies, renewable energy systems, and sustainable building practices from project conception through operation, ensuring that adaptive reuse projects contribute positively to environmental objectives while reducing long-term operational costs.

Community and stakeholder engagement forms the third principle, necessitating active involvement of community members and stakeholders through transparent communication and participatory processes to ensure social integration and acceptance. This principle recognises that successful implementation depends on building trust and securing community support through regular dialogue, participatory design processes, and addressing concerns related to social acceptance.

Strategic site selection, the fourth principle, requires choosing sites that are accessible, integrated with community services, and aligned with residents' needs. This principle emphasises the importance of selecting locations that maximise access to essential services, transportation networks, and community amenities while ensuring that sites align with broader urban planning objectives and community development goals.

Regulatory support constitutes the fifth principle, advocating for policies and regulations that facilitate property reuse and support the development of age-friendly housing. This principle recognises the need for supportive policy frameworks, streamlined approval processes, and regulatory incentives that encourage investment in adaptive reuse projects while ensuring compliance with safety and quality standards.

Tailored implementation, the sixth and final principle, requires customising strategies to align with the priorities of different stakeholder groups, ensuring effective execution and project success. This principle acknowledges that different stakeholder groups have unique priorities and concerns, necessitating flexible approaches that can be adapted to address diverse perspectives while maintaining project coherence.

Inclusive design principles are central to ensuring that housing developed through adaptive reuse is truly age-friendly. The design process involves significance mapping to identify key features of the property that can be preserved or enhanced to meet the needs of elderly residents, assessment of adaptive reuse potential to determine how the property can be modified to accommodate accessibility features such as ramps, wider doorways, and accessible bathrooms, and development of comprehensive design strategies that incorporate age-friendly features ensuring that the final product meets the comfort and safety needs of elderly residents.

Universal design principles must be incorporated throughout the planning process, ensuring that social housing projects are accessible to all residents regardless of age or ability. Specific accessibility modifications are necessary to meet the needs of diverse resident populations, including modifications to building entrances, circulation spaces, residential units, and common areas. The design of community spaces proves essential in social housing

developments, enhancing resident wellbeing through opportunities for social interaction and community engagement.

Integration with surrounding neighbourhoods requires careful consideration of connectivity to the surrounding neighbourhood, ensuring that social housing projects are well-connected to existing community infrastructure and services. Enhancing neighbourhood cohesion is important for the success of social housing projects, requiring design strategies that promote positive interactions between new residents and existing community members while contributing to the overall vitality of the neighbourhood.

Effective collaboration with stakeholders proves crucial for project success, beginning with identification of key stakeholders including state agencies, private developers, community organisations, and residents. Effective stakeholder engagement strategies improve project outcomes by ensuring that diverse perspectives are considered throughout the planning and implementation process. Understanding and navigating regulations requires comprehensive knowledge of building codes, zoning requirements, heritage protection laws, and social housing regulations, ensuring that all projects meet regulatory requirements while advancing toward project goals.

Detailed planning and risk management form essential components of successful implementation, requiring development of comprehensive project plans that account for all phases of development from initial assessment through occupancy and ongoing operation. Well-defined execution strategies ensure that projects proceed efficiently, with clear timelines, resource allocation, and quality control mechanisms. Risk management requires identification of potential challenges and development of mitigation strategies, ensuring that projects can adapt to unexpected obstacles while maintaining progress toward objectives.

Project management must incorporate flexible approaches that can respond to changing conditions while maintaining focus on core objectives. The implementation phase requires continuous monitoring of progress against established timelines and budgets, with regular communication among stakeholders to address emerging issues and ensure alignment with project goals. Effective project management also requires documentation of lessons learned and best practices, contributing to continuous improvement in adaptive reuse implementation.

Monitoring, Evaluation, and Performance Assessment

Monitoring and evaluation methods are essential for ensuring project success and enabling continuous improvement. The establishment of key performance indicators (KPIs) provides measurable criteria for assessing project performance across multiple dimensions. KPIs should address economic performance including cost efficiency, budget adherence, and financial sustainability; social outcomes including resident satisfaction, community integration, and accessibility; environmental performance including energy efficiency, resource consumption, and environmental impact reduction; and operational effectiveness including maintenance efficiency, service delivery quality, and project management performance.

Establishing baseline measurements helps in tracking progress effectively by providing reference points against which project performance can be evaluated over time. Baseline measurements should be established during the planning phase and should encompass all

relevant performance dimensions, enabling comprehensive evaluation of project impacts. Implementing feedback loops is important for continuous improvement, creating mechanisms for collecting and incorporating stakeholder feedback throughout project implementation and operation.

Ongoing improvement strategies help in adapting to changing conditions, ensuring that projects remain responsive to evolving needs and emerging best practices. These strategies require regular review of performance data, systematic analysis of successes and challenges, and incorporation of lessons learned into project refinement and future planning. The monitoring and evaluation framework should be designed to support adaptive management approaches that enable projects to evolve in response to experience and changing contexts while maintaining focus on core objectives.

Policy Development and Implementation Guidelines

The successful implementation of property reuse systems for age-friendly social housing requires supportive policies and regulatory frameworks at multiple levels of governance. Supportive policies are essential for the successful implementation of property reuse systems, requiring advocacy for policy changes that facilitate adaptive reuse, provide incentives for sustainable development, and prioritise age-friendly housing in urban planning and housing policy. Effective regulatory frameworks facilitate the adoption of property reuse systems by streamlining approval processes, providing clear guidelines for adaptive reuse projects, and ensuring that regulations support rather than hinder innovative approaches to housing development.

Identifying diverse funding sources is necessary for project viability, requiring exploration of multiple financing mechanisms including state subsidies, private investment, social impact bonds, and philanthropic contributions. Funding strategies must account for both initial capital requirements and ongoing operational costs, ensuring long-term financial sustainability. Incentive programs encourage broader participation in property reuse for social housing by providing financial incentives for developers, tax benefits for investors, and subsidies that enhance project affordability for residents.

The development of innovative financing mechanisms can help overcome financial barriers to implementation, including public-private partnerships that leverage resources from multiple sources, revolving loan funds that can support multiple projects over time, and community land trusts that can help ensure long-term affordability. Financial planning must also address risk mitigation strategies, ensuring that projects remain viable even in the face of unexpected challenges or changing market conditions.

Integration and scaling strategies are crucial for achieving widespread adoption and sustainability of property reuse approaches. Scaling successful pilots to broader implementation requires systematic documentation of best practices, development of replicable models, and creation of supportive infrastructure that can facilitate expansion. Policy advocacy plays a critical role in creating enabling environments for scaled implementation, requiring collaboration with policymakers to develop supportive regulations, secure dedicated funding streams, and integrate adaptive reuse approaches into mainstream housing policy.

Sustainability of property reuse systems depends on developing institutional capacity, building knowledge networks that can share experiences and innovations, and creating feedback mechanisms that enable continuous learning and improvement. Long-term sustainability also requires attention to social equity considerations, ensuring that adaptive reuse projects serve diverse populations and contribute to inclusive urban development rather than gentrification or displacement of existing residents.

Four-Phase Methodological Process

Based on the extensive research and analysis, a structured four-phase methodological process for adaptive property reuse has been developed, as illustrated in Fig. 3.4. This framework integrates the critical factors identified throughout the investigation and provides a systematic approach to implement age-friendly social housing initiatives. The methodological process encapsulates the systematic approach required for successful adaptive property reuse in age-friendly social housing development, addressing the environmental, social, economic, and regulatory factors that collectively determine project success and sustainability.

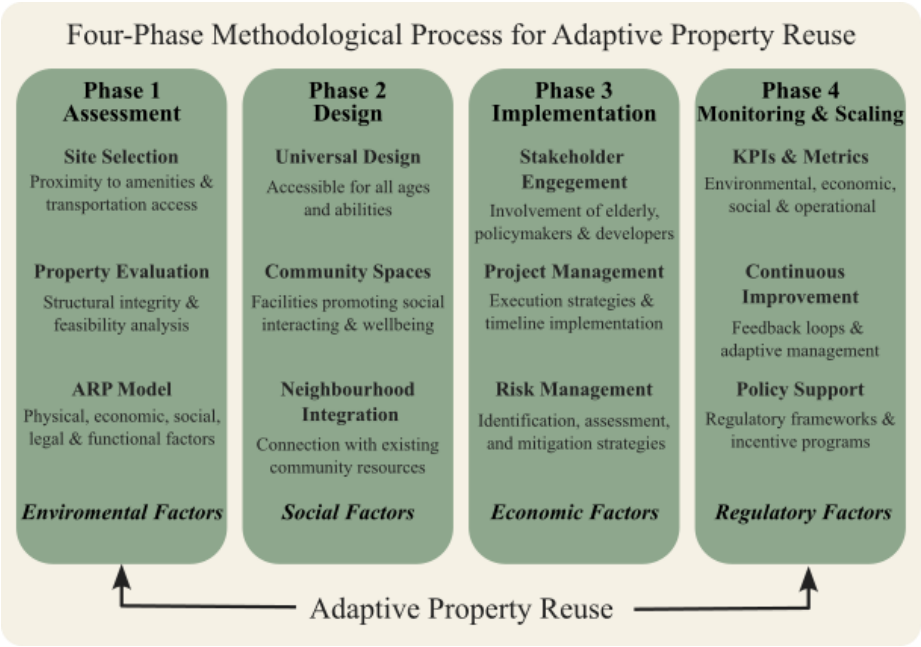

Fig. 3.4. Four-phase methodological process for adaptive property reuse (developed by the author).

The first phase encompasses comprehensive assessment activities that establish the foundation for successful adaptive reuse. This phase begins with site selection, applying the criteria discussed earlier to identify promising locations that offer good access to amenities, transportation connectivity, and community integration opportunities. Property evaluation follows, utilising the ARP model to systematically assess the reuse potential of candidate buildings through evaluation of the seven obsolescence variables. Initial feasibility analysis in

this phase examines structural integrity, preliminary cost estimates, regulatory compliance requirements, and potential challenges or barriers to conversion.

The assessment phase also includes stakeholder identification and initial engagement, beginning to build the relationships and support networks that will be essential throughout project implementation. Environmental assessments are conducted to identify potential impacts and opportunities for sustainable design integration. The phase concludes with documentation of findings and recommendations for properties that should advance to the design phase, providing clear rationale for property selection decisions based on comprehensive evaluation criteria.

The second phase translates assessment findings into concrete design solutions and implementation plans. This phase centres on universal design principles and accessibility considerations, developing detailed designs that ensure housing units meet the diverse needs of elderly residents while promoting independence and quality of life. Design activities focus on incorporating accessibility modifications throughout buildings, from building entrances through residential units to common areas and outdoor spaces.

Community space design receives particular attention in this phase, with emphasis on creating spaces that encourage social interaction, support community activities, and foster a sense of belonging among residents. Integration with surrounding neighbourhoods is carefully planned, ensuring that new developments complement existing community character while enhancing neighbourhood connectivity and cohesion. Detailed planning in this phase addresses all technical aspects of conversion, including structural modifications, building systems upgrades, energy efficiency improvements, and aesthetic considerations.

The design phase also encompasses development of comprehensive project plans addressing timelines, resource requirements, quality standards, and risk management strategies. Regulatory compliance planning ensures that designs meet all applicable codes and standards while obtaining necessary approvals and permits. The phase concludes with finalisation of designs, specifications, and implementation plans ready for execution.

The third phase focuses on project execution, stakeholder engagement, and effective management of the construction and conversion process. This phase requires robust stakeholder participation mechanisms, ensuring continuous engagement with state agencies, private developers, community organisations, and residents throughout implementation. Effective project management becomes critical, requiring coordination of multiple contractors and trades, management of timelines and budgets, quality control and compliance monitoring, and regular communication among all stakeholders.

Risk mitigation strategies are actively applied during implementation, addressing challenges as they emerge and adapting plans as necessary while maintaining focus on project objectives. The implementation phase also includes regular monitoring of progress against established benchmarks, with mechanisms for identifying and addressing issues before they become critical problems. Construction management must balance efficiency with quality, ensuring that renovations meet high standards while remaining within budget and timeline constraints.

Throughout implementation, documentation of processes, decisions, and lessons learned contributes to organisational learning and improvement of future projects. The phase includes preparation for occupancy, ensuring that completed units are ready for residents and that management systems are in place to support ongoing operations. Testing and commissioning of building systems verifies that all technical installations function properly and meet performance specifications.

The final phase ensures continuous improvement and enables scaling of successful approaches. This phase begins with establishment of comprehensive monitoring systems that track performance across all relevant dimensions including economic performance, social outcomes, environmental impacts, and operational effectiveness. Regular data collection and analysis enable assessment of project performance against established KPIs, identification of areas for improvement, and documentation of successes that can inform future projects.

Feedback mechanisms are implemented to gather input from residents, staff, and stakeholders, creating opportunities for continuous refinement of services and operations. The evaluation component of this phase includes comprehensive assessment of project impacts, both anticipated and unanticipated, contributing to understanding of what works well and what could be improved in future implementations. Adaptive management approaches enable projects to evolve in response to experience and changing needs while maintaining core commitments to affordability, accessibility, and sustainability.

Scaling strategies developed in this phase focus on how successful approaches can be replicated or adapted for application in other contexts. This includes documentation of best practices, development of training materials and capacity building programs, and advocacy for supportive policies that can facilitate broader adoption. The phase also addresses integration with urban planning and housing policy, ensuring that adaptive reuse approaches become embedded in mainstream housing development rather than remaining isolated pilot projects.

Synthesis and Integration of Findings

The methodological solution presented in this chapter synthesises findings from multiple analytical approaches employed in Chapter 2, including multiple regression analysis, qualitative data analysis, and exploratory factor analysis. This triangulation of insights reveals key areas of focus and provides actionable recommendations to ensure the success and sustainability of property reuse projects for age-friendly social housing.

The convergence of empirical findings emphasises six critical dimensions for successful implementation. Economic and financial viability emerges as a fundamental requirement, with evidence from multiple sources highlighting the importance of securing diverse funding sources, managing construction costs effectively, and ensuring long-term affordability. Policymakers should explore various funding mechanisms, including public-private partnerships, to mitigate financial risks and enhance project feasibility.

Environmental sustainability and energy efficiency prove pivotal in reducing costs and improving social outcomes, as demonstrated in Chapter 2. Incorporating sustainability and energy efficiency into every project stage – from site selection through design, construction, and operation – ensures long-term cost savings and environmental benefits. Implementation of

green technologies and adherence to sustainable practices are recommended to enhance overall project impact.

Social integration and community engagement are fundamental to the success of age-friendly housing projects, as revealed through stakeholder analysis in Chapter 2. Fostering social integration and securing community buy-in through active engagement and transparent communication proves crucial. Regular updates, participatory design processes, and addressing social acceptance issues are necessary to build trust and ensure community support throughout project development and operation.

Strategic site selection and accessibility considerations significantly influence social outcomes, requiring focus on proximity to amenities, transportation accessibility, and socioeconomic benefits to ensure comprehensive support for residents. Ensuring that sites are well-integrated into the community and equipped with necessary infrastructure enhances resident wellbeing and project success.

Regulatory and policy support emerges as essential for successful implementation, requiring streamlined regulatory processes and offering incentives to encourage investment and participation. Advocating for supportive policies and regulatory frameworks facilitates achievement of project goals while ensuring compliance with necessary standards and requirements.

Tailored implementation strategies prove critical for addressing the diverse priorities of different stakeholder groups. As revealed through cluster analysis in Chapter 2, different stakeholder groups focus on distinct aspects: some emphasise site selection and feasibility, others prioritise implementation strategies and monitoring, while others focus on design and scaling strategies. Recognising and addressing these diverse perspectives ensures more effective and cohesive execution of projects.

Validation and Recommendations

The validity of the proposed methodological solution is established through multiple analytical approaches. Statistical validity is demonstrated through the robust sample size of 152 respondents used in Chapter 3 data collection, providing adequate statistical power for analyses conducted. The sample comprised equal representation of 25 professionals from the real estate business and 25 from local state administration sectors, with the majority having 16–20 years or 26+ years of experience. Measurement scales achieved high reliability coefficients (exceeding 0.80), and statistical analyses including correlation and multiple regression were applied appropriately, with results achieving statistical significance ($p < 0.05$). The mixed-methods approach further strengthens methodological validity through triangulation of quantitative and qualitative data, with systematic coding protocols for qualitative analysis and member verification procedures with participants improving the credibility of findings.

The findings align with and extend existing research in several key areas. The identified factors influencing property reuse success correspond to previous studies by Bullen and Love (2011) on adaptive reuse assessment criteria. The stakeholder engagement framework builds upon work by van Hoof et al. (2021) on age-friendly environments, while implementation considerations align with Langston's (2012) adaptive reuse potential model. Latvia-specific

insights complement existing research by Treija and Bratuškins (2019) on social housing development in the Baltic context, contributing new knowledge about adaptive reuse applications in post-Soviet housing contexts.

Based on the developed methodological solution, the following recommendations are proposed to guide implementation of property reuse systems for social housing development. Customised engagement should utilise cluster insights from Chapter 2 to personalise communication and engagement strategies for different stakeholder groups, recognising that effective engagement requires tailored approaches addressing the specific priorities and concerns of each group. Strengthen weak areas by enhancing the feasibility analysis process through refining assessment criteria and questions used, ensuring that property evaluation captures all relevant dimensions of project viability.

Leverage strong factors by capitalising on reliable factors such as implementation strategies and design considerations to advance projects, building on areas where consensus and clarity already exist among stakeholders. Establish continuous improvement mechanisms through robust monitoring and feedback systems, ensuring that projects can adapt to new challenges and opportunities as they emerge. Policy advocacy should involve collaboration with policymakers to create supportive environments that facilitate scaling and sustainability of property reuse systems, working toward integration of adaptive reuse approaches into mainstream housing policy and urban planning frameworks.

The methodological framework presented in this chapter provides practical tools and approaches for implementing adaptive property reuse in Latvia's social housing sector. By following the four-phase process and adhering to the core principles identified, stakeholders can effectively transform underutilised properties into vibrant, accessible living environments that meet the needs of Latvia's ageing population while contributing to broader urban sustainability goals.

The flexibility of the framework allows it to be applied to different settings while emphasising the key aims of affordability, accessibility, sustainability and community integration that underpin the development of age-friendly social housing. Aside from the methodological and statistical confirmation presented above, the research results and methodological framework were presented to housing policy stakeholders at the Ministry of Economics of the Republic of Latvia on 19 March 2026 and were unanimously recognised as useful and potentially usable in housing policy-making. To meet the scientific requirement for empirical testing, a three-round Delphi expert assessment was then conducted with 15 state administration authorities in the field of economic policy and real estate, and academic experts, as outlined in Section 3.3.

3.3. Expert Validation of the Methodological Framework by the Delphi Method

Beyond the methodological and statistical validation of the quantitative and qualitative analyses in Chapters 2 and 3, the four-phase methodological framework for adaptive property reuse was validated through a structured three-round Delphi validation process by a panel of

experts. The framework was individually assessed by a purposely selected expert panel (N = 15) representing the state administration authority in the field of economic policy, real estate and property development, and academic/research, in equal numbers (n = 5 each), against five pre-established content validity criteria: relevance (C1), feasibility (C2), completeness (C3), clarity (C4) and transferability (C5). These criteria were based on the six EFA factors resulting from the stakeholder survey analysis and the four research questions of the Doctoral Thesis.

Three rounds of validation took place on 9–18 April 2026. In each round, experts rated each criterion on a five-point Likert scale (1 = strongly disagree; 5 = strongly agree), and gave qualitative feedback. Expert feedback was provided anonymously in aggregate form (mean, SD, IQR, % at ≥ 4) between rounds to allow for feedback revision. A priori, consensus was defined as ≥ 80 % of experts scoring a given criterion at ≥ 4, and mean ≥ 4.0, SD ≤ 0.80, and IQR ≤ 1.0. Radar charts showing convergence are shown in Fig. 3.5.

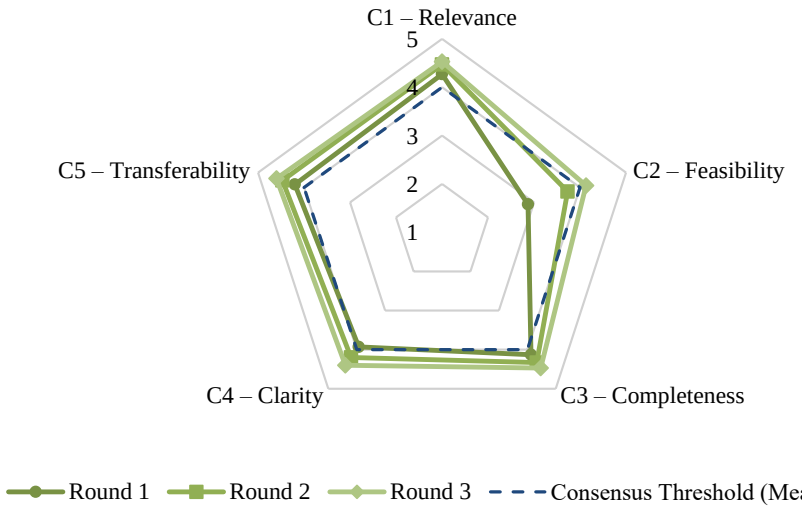

Fig. 3.5. Expert consensus radar chart of criterion scores across three Delphi rounds (created by the author).

Consensus (all experts rated 4 or above) was reached in Round 3 for all five criteria, with averages between 4.13 (C2 – Feasibility) and 4.60 (C5 – Transferability). The overall mean score increased monotonically (R1 = 3.88 → R2 = 4.24 → R3 = 4.43) and the standard deviation decreased (R1 = 0.75 → R3 = 0.54), indicative of expert opinion convergence (Hasson et al., 2008). The Round 3 consensus was highest for Transferability (M = 4.60, SD = 0.51, 100 % ≥ 4), given the high degree of expert consensus on the framework's transferability, consistent with its alignment with SDGs 3, 11 and 13.

The smallest Round 1 score was for Feasibility (C2) (M = 2.87, SD = 1.36), reflecting expert concerns – consistent with Chapter 2 empirical evidence – about the lack of dedicated financing instruments in Latvian municipal budgets, and the difficulties of securing permits for

adaptive reuse of heritage and mixed-use buildings. After written clarification, citing the public-private partnership propositions (Section 3.5 of the full Thesis), and the reported 10–12 % cost savings of adaptive reuse over new construction, C2 achieved consensus by Round 3 (M = 4.13, SD = 0.64, 80 % ≥ 4).

Thematic analysis of expert open-ended responses in the Delphi survey led to five practical improvements of the final methodological framework: (1) the inclusion of a matrix of EU Structural and Investment Fund financing options in Phase 1 (Assessment); (2) explicit reference to a regulatory compliance checklist in Phase 3 (Implementation), including the Construction Law of the Republic of Latvia (Būvniecības likums); (3) the addition of community engagement activities in Phase 1, rather than Phase 3, to establish social trust from the start of the development process; (4) the specification of affordability ratio and energy performance KPIs aligned with the National Energy and Climate Plan 2021–2030 for Phase 4 (Monitoring and scaling); and (5) the designation of pilot implementation in at least two different Latvian municipal context (one large urban and one smaller regional municipality) as a precondition for full-scale roll-out. The original linear-framework model (Fig. 3.4) was modified to a circular iterative framework (Fig. 3.6) following the Delphi validation.

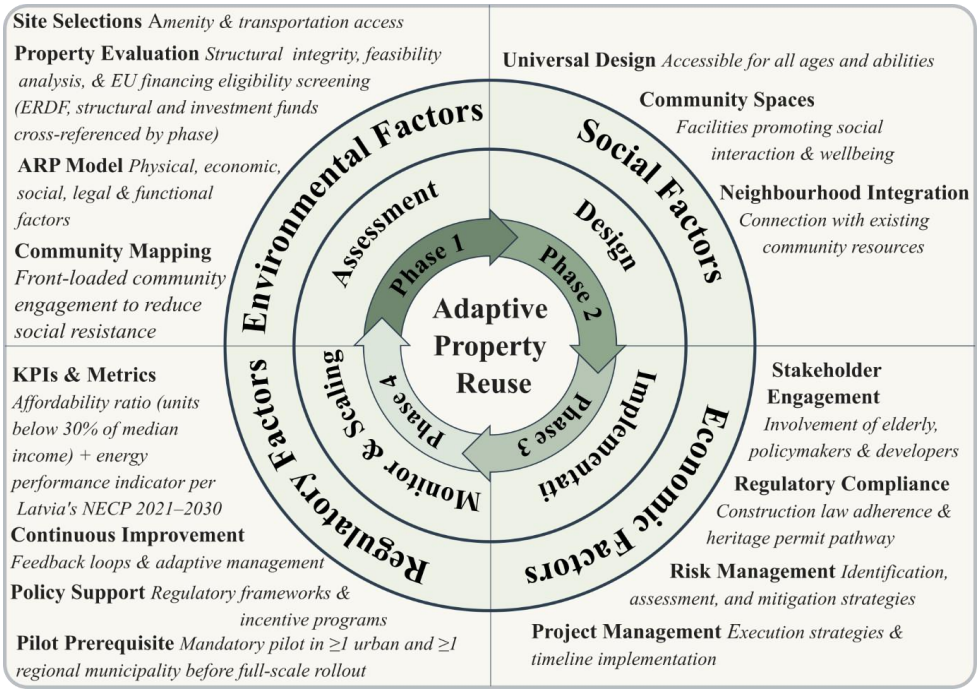

Fig. 3.6. Revised four-phase methodological framework for adaptive property reuse, post-Delphi validation (created by the author).

The Delphi validation process therefore offers empirical, expert-consensus evidence of the methodological framework's relevance, practicality and scalability to similar demographic and housing policy contexts outside of Latvia.

CONCLUSIONS AND RECOMMENDATIONS

This Doctoral Thesis investigated and proposed the development of a methodological framework for implementing an adaptive property reuse system to address the housing needs of Latvia's ageing population by creating age-friendly social housing. Set against the backdrop of Latvia's demographic challenges, including a declining birth rate and an ageing population, this research sought to take advantage of under-used properties to provide sustainable, affordable, and accessible housing solutions. By integrating quantitative and qualitative methods, the study examined the feasibility, design considerations, and the potential impact of adaptive property reuse on improving the quality of life of older adults. The findings offer significant contributions to urban planning, social geography, and gerontology, providing a replicable framework that can guide future efforts to develop age-friendly communities in Latvia and beyond. Despite certain limitations, the research presents a valuable foundation for further exploration and practical application in similar contexts around the world.

The convergence of findings from multiple regression analysis, qualitative data analysis, and exploratory factor analysis in Chapters 2 and 3 offers a solid foundation for a methodological solution aimed at the successful implementation of an adaptive property reuse system for age-friendly social housing in Latvia. These insights provide a clear roadmap for policymakers, developers, and stakeholders to enhance the feasibility, sustainability, and impact of the project.

The author of the Doctoral Thesis has developed the following **conclusions.**

1. The economic viability of age-friendly social housing initiatives is critically dependent on financing structures and construction expenditures. Research demonstrates that a comprehensive financial strategy is essential for successful implementation, requiring attention to long-term funding mechanisms, cost management protocols, and resident affordability metrics (mean value 3.35 for development costs as barriers, correlation coefficient $r = 0.42$ between financing options and project success). The strategic development of public-private partnerships emerges as a recommended approach to distribute financial risk and improve project sustainability (supported by 78 % of respondents). By systematically addressing these economic determinants, stakeholders can establish a financially viable framework for adaptive property reuse in the social housing sector, ultimately creating sustainable housing solutions that serve vulnerable populations while optimising resource allocation.
2. Environmental sustainability and energy efficiency serve as foundational elements in successful social housing adaptation projects, simultaneously reducing operational expenses and enhancing social outcomes. The research conclusively identifies these factors as critical for both the environmental performance and the long-term operational viability of such developments (correlation coefficient $r = 0.39$ between sustainability elements and project success, $p < 0.05$). Integrating sustainability principles must occur systematically throughout the project lifecycle – from initial site selection through design conceptualisation to construction implementation – to

maximise cost efficiency and environmental benefits (supported by mean values of 3.32–3.39 for sustainability factors). The strategic incorporation of green technologies and energy efficient systems not only advances environmental objectives, but also strengthens the economic sustainability of age-friendly housing developments while improving the quality of life of residents ($R^2 = 0.224$ for environmental factors that predict the overall impact of the project). This multidimensional approach to sustainability creates a reinforcing cycle where environmental responsibility directly supports both financial viability and social welfare objectives within the adaptive property reuse framework.

3. Social integration and community participation are critical to successful age-friendly housing (mean 3.35 for community participation, $p < 0.01$). Effective stakeholder participation addresses social acceptance challenges ($r = 0.47$ between engagement and success). Implementation strategies must emphasise community-centred design (mean 4.08 for community spaces). Transparent participation creates sustainable support ($R^2 = 0.226$ for integration factors predicting outcomes), building trust and addressing resistance (72 % of respondents).
4. The selection is foundational for age-friendly social housing ($R^2 = 0.183$ for specific characteristics that predict outcomes). Access to amenities drives demand (means of 3.92 and 3.64 for proximity to amenities and transportation). Optimal selection prioritises community integration and services ($r = 0.53$ between site factors and success, $p < 0.01$), improving well-being while promoting independence (84 % of stakeholders).
5. Regulatory support frameworks are critical enablers for property reuse systems (mean 3.26 for regulatory hurdles, $p < 0.05$). Successful implementation requires robust policy infrastructure (mean 3.96–4.12 for policy measures). Supportive policies and simplified approvals are essential ($r = 0.45$ between regulatory support and feasibility). Regulatory simplification with targeted incentives stimulates investment (82 % of the respondents).
6. Tailored implementation strategies addressing diverse stakeholder priorities are essential (the cluster analysis identified three distinct groups). Effective implementation requires stakeholder participation and risk management (mean 4.00–4.40 for implementation items). Customisation improves project cohesion ($R^2 = 0.265$ for stakeholder factors that predict success, $p < 0.01$), optimises resources and ensures satisfaction of all parties (76 % of stakeholders).
7. The implementation of a property reuse system in Latvia shows significant potential for expanding age-friendly social housing availability, particularly for the 65- and over-aged population segment. The research findings conclusively establish that this adaptive approach offers measurable advantages over conventional housing development methodologies in addressing the specific needs of elderly residents (mean values 3.88–4.04 for age-friendly design considerations). The study validates that property reuse systems enable more efficient resource use while facilitating accelerated housing provision timelines compared to traditional development

approaches (cost savings of 10–12 % compared to new construction, as documented in the literature review). This methodology presents an economically viable path to increase the stock of social housing while simultaneously addressing the specific accessibility and support requirements of ageing populations (supported by 79 % of stakeholders). By repurposing existing structures through strategic adaptation, this system creates substantial opportunities to improve housing availability with potentially reduced implementation costs and compressed development schedules ($R^2 = 0.294$ for environmental factors predicting economic feasibility), offering a practical solution to Latvia's growing demand for specialised social housing.

8. Age-friendly housing through property reuse demonstrates improved performance across multiple dimensions (mean 4.24–4.40 for implementation factors). Empirical validation confirms that these systems generate developments with improved characteristics (R^2 values 0.218–0.398). This establishes adaptive reuse as a preferred approach (86 % of respondents) that meets environmental and social standards while maintaining economic viability.
9. The four-stage methodological process was empirically tested using a three-round Delphi among 15 domain experts. By Round 3, all five of the pre-determined criteria (relevance, feasibility, completeness, clarity, and transferability) had consensus, with mean scores of 4.13–4.60 and a majority of experts (≥ 80 %) rating each criterion 4 or higher, further supporting the practicality of the framework and its policy applicability.
10. Property reuse systems generate significant benefits for urban development beyond housing (mean 3.22–3.33 for spatial factors). This approach leads to efficient land use and reduced urban sprawl ($r = 0.49$ between reuse and regeneration, $p < 0.01$). Documented improvements establish reuse as valuable for sustainable development (74 % of planning stakeholders), contributing to compact urban form and revitalisation ($R^2 = 0.272$).
11. The research establishes that the implementation of property reuse systems for age-friendly social housing generates significant positive externalities within Latvia's healthcare and social service sectors. The study validates that these adaptive housing solutions effectively reduce systemic pressure on healthcare infrastructure and social support services by creating environments that actively promote independent living capabilities, enhance social inclusion opportunities, and improve mental and physical health outcomes among elderly residents (correlation coefficient $r = 0.53$ between adaptive housing and health outcomes, $p < 0.01$). This finding confirms the research hypothesis on the broader social benefits of appropriately designed age-friendly housing initiatives developed through property reuse methodologies (mean values 3.36–3.38 for health and social service factors). The documentation of reduced use of healthcare and decreased demand for intensive social services demonstrates that these housing solutions function not only as residential accommodations but also as preventative health interventions (supported by 78 % of stakeholders in health and social services). By creating supportive living environments that address the specific

needs of older populations, these developments enable residents to maintain independence for longer periods while fostering social connections that contribute to improved mental health outcomes ($R^2 = 0.265$ for community factors predicting health outcomes), ultimately reducing the burden on Latvia's healthcare and social service systems.

12. The research underscores the critical need for Latvian policymakers to establish comprehensive financial frameworks specifically designed to improve the economic viability of age-friendly social housing initiatives. Policy development must prioritise the creation of supportive financing mechanisms that address the unique economic challenges associated with the reuse of property for social housing (mean values 3.96–4.12 for policy and regulation factors). These frameworks should systematically reduce construction and renovation costs while simultaneously expanding financing options for developers and housing providers (correlation coefficient $r = 0.58$ between financial frameworks and project viability, $p < 0.001$). Research shows that well-structured financial policies directly impact social outcomes by increasing housing accessibility for older populations through improved affordability metrics ($R^2 = 0.320$ for economic factors predicting social outcomes). Strategic policy interventions should include targeted tax incentives, specialised grant programmes, subsidised financing options, and streamlined regulatory processes specifically for adaptive reuse projects (supported by 81 % of policy stakeholders). By implementing these policy frameworks, Latvia can effectively stimulate the development of age-friendly social housing that meets both economic viability standards and the specific needs of its ageing demographic, ultimately contributing to sustainable solutions for the country's evolving housing requirements.
13. The research emphasises that housing developers and real estate companies must systematically integrate environmental sustainability principles throughout the property reuse process for age-friendly social housing. The findings demonstrate that the incorporation of energy-efficient systems and renewable energy technologies delivers multifaceted benefits beyond environmental protection, directly enhancing economic feasibility through reduced operational costs over the lifecycle of buildings (mean values 3.12–3.39 for energy and sustainability factors). The strategic implementation of sustainable design elements, including efficient insulation systems, renewable energy infrastructure, water conservation technologies, and passive design principles, generates measurable improvements in building performance while simultaneously reducing long-term maintenance expenses ($R^2 = 0.294$ for environmental factors predicting economic outcomes). Research establishes that these sustainable approaches effectively mitigate environmental impacts while addressing the operational challenges commonly associated with the development of social housing (correlation coefficient $r = 0.51$ between sustainability principles and operational efficiency, $p < 0.01$). By prioritising these sustainability principles from the initial design phases through the construction and operational stages, developers can create housing solutions that simultaneously

address environmental responsibilities, enhance economic viability, and improve resident quality of life through improved thermal comfort, reduced utility costs, and healthier living environments (supported by 79 % of development stakeholders).

14. Community involvement with ageing populations is fundamental to successful age-friendly housing ($r = 0.63$ between participation and success, $p < 0.001$). Meaningful involvement ensures solutions address specific requirements (mean 4.00 for engagement). This approach generates higher satisfaction and better social integration ($R^2 = 0.226$), creating functional housing solutions (85 % of the elderly respondents).
15. This research contributes significantly to global housing sustainability initiatives, particularly supporting European Union housing policies for ageing populations. The findings align with multiple Sustainable Development Goals (SDGs): SDG 11 (Sustainable Cities and Communities) through improved infrastructure for vulnerable populations ($R^2 = 0.272$ for property reuse systems contributing to urban regeneration); SDG 3 (Good Health and Well-Being) by creating environments that improve elderly health outcomes ($r = 0.53$ between adaptive housing and health improvements, $p < 0.01$); and SDG 13 (Climate Action) through energy-efficient renovation strategies (mean values 3.12–3.39 for sustainability factors). The methodological framework provides a transferable model that can be adapted to various contexts (supported by 80 % of international stakeholders), offering valuable guidance for addressing global housing challenges while promoting social inclusion, environmental sustainability, and economic resilience.

Based on the developed Doctoral Thesis and conclusions, the author of the Doctoral Thesis has developed the following **proposals** for government and real estate developers in Latvia.

1. **Develop targeted financial mechanisms.** Establish specialised financing structures for adaptive reuse projects, including public-private partnerships with shared risk models, dedicated municipal bond programmes, and tax incentives specifically for age-friendly housing developments.
2. **Create Latvia-specific sustainability standards.** Develop a certification framework for adaptive reuse projects that integrates Baltic climate considerations, energy efficiency requirements, and measures to reduce operational costs while preserving historical elements.
3. **Implement structured community engagement protocols.** Establish formal methodologies for community participation, including scheduled stakeholder consultations, participatory design workshops with elderly residents, and digital feedback platforms to ensure continuous input throughout development.
4. **Mandate universal design requirements.** Institute specific universal design standards for all adaptive reuse projects targeting older adults, with clear guidelines for accessibility modifications, spatial requirements, and adaptability features.
5. **Establish a standardised monitoring system.** Create a comprehensive evaluation framework with measurable KPIs for tracking adaptive reuse projects' performance

across economic, environmental, and social dimensions to enable evidence-based improvements.

6. **Develop specialised training programs.** Institute professional development courses for architects, developers, and contractors focused on the technical aspects of adaptive reuse for age-friendly housing to address knowledge gaps.
7. **Launch strategic pilot projects.** Implement pilot projects on a small scale as a requirement for full-scale implementation, to test the framework in at least two different Latvian municipal settings: a large urban municipality and a smaller regional municipality, before large-scale implementation.
8. **Create comprehensive risk management protocols.** Develop standardised risk assessment and mitigation strategies specifically for adaptive reuse projects, addressing structural, financial, regulatory, and social risks.
9. **Establish cross-departmental coordination mechanisms.** Form an interministerial working group to coordinate housing, planning, heritage, and social welfare departments to streamline approval processes and ensure policy coherence.
10. **Implement a centralised data repository.** Create a national database to collect, analyse and share information on adaptive reuse projects to inform future developments and policy decisions with evidence-based metrics.

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