

THE CONCEPT OF LIVING QUALITY AND EVALUATION CRITERIA IN MULTI-STOREY RESIDENTIAL BUILDINGS

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Annotation: *The process of urbanization is leading to an increase in the share of multi-storey residential buildings, and as a result, the issue of living quality is becoming increasingly relevant in urban planning. The article analyzes scientific approaches to the concept of living quality in multi-storey housing. Living quality in residential complexes is determined by multi-dimensional criteria such as ecological conditions, acoustics, safety, functional convenience, and social integration. The study examines the advantages and limitations of assessment methodologies including surveys, expert evaluations, the Analytic Hierarchy Process (AHP), and environmental measurements. A comparative analysis based on research conducted in China, Belgium, Vietnam, Hong Kong, and Uzbekistan is presented, highlighting advanced international practices and innovative design solutions for enhancing living quality in multi-storey buildings, such as double-layer glass façades, green areas, and communal spaces. The results demonstrate that living quality in multi-storey housing is shaped by the combined influence of numerous factors and emphasize the importance of effective management.[1]*

Annotatsiya. *Urbanizatsiya jarayoni ko'p qavatli turar joylar ulushining ortishiga olib kelmoqda va buning natijasida yashash sifati masalasi shaharsozlikda dolzarb bo'lib bormoqda. Maqolada ko'p qavatli uy-joylarda yashash sifati tushunchasining ilmiy yondashuvlari tahlil qilinadi. Turar joy komplekslarida yashash sifati ekologik holat, akustika, xavfsizlik, funksional qulaylik va ijtimoiy integratsiya kabi ko'p o'lchamli mezonlar bilan belgilanadi. Ushbu mezonlarni baholashda qo'llaniladigan so'rovnomalar, mutaxassislar ekspertizasi, analitik ierarxiya usuli (AHP) hamda atrof-muhit o'lchovlari kabi metodikalarning ustunlik va cheklovlari ko'rib chiqiladi. Xitoy, Belgiya, Vetnam, Hongkong va O'zbekiston tadqiqotlari misolida qiyosiy tahlil o'tkazilib, ko'p qavatli uy-joylarda yashash sifati bo'yicha ilg'or xalqaro tajribalar va innovatsion dizayn yechimlari, jumladan ikki qavatli shisha fasadlar, yashil hududlar va jamoaviy joylar tashkil etish keltiriladi. Natijalar ko'p qavatli uy-joylarda yashash sifati ko'plab omillarning birgalikdagi ta'siri bilan shakllanishini va samarali boshqaruvning muhimligini ko'rsatadi[1].*

Keywords. *Multi-storey residential buildings; living quality; environmental conditions; acoustic comfort; safety; social integration; evaluation criteria; post-occupancy evaluation; double-layer glass façade.*

Kalit so'zlar. *Ko'p qavatli uy-joy; yashash sifati; ekologik holat; akustik qulaylik; xavfsizlik; ijtimoiy integratsiya; baholash mezonlari; post-okkupatsion baholash; ikki qavatli*

shisha fasad. Introduction. Multi-storey residential buildings represent an efficient form of affordable and intensive construction in large cities and densely populated areas. However, their rapid growth generates social, environmental, and psychological challenges. A number of studies link living quality in residential environments to comfort, safety, a healthy environment, and the degree of social connection. For example, in the Yangtze River Delta region of China, an evaluation system for open spaces in high-rise housing complexes was developed, consisting of six dimensions: functional diversity, safety (daily, social, and hygienic), spatial variety, accessibility, and sustainability [2]. These indicators are primarily aimed at determining the value of outdoor residential spaces for users.

The concept of living quality has a multidisciplinary nature. Indoor environmental quality is shaped by thermal comfort, air quality, ventilation, humidity control, natural and artificial lighting, acoustic protection, and the ecological safety of building materials [3]. Health and safety conditions are also emphasized. According to research conducted in Hong Kong, a healthy building should not pose risks to residents' health, should not be excessively dense, must ensure natural ventilation and sunlight access, protect from noise and pollution, and be equipped with clean water supply and waste-management systems [1]. A safe building should have structural stability, properly installed electrical and gas systems, evacuation routes, and be located in an area with low exposure to natural hazards [1].

High-rise residential buildings are also evaluated from a social perspective. Research indicates that multi-storey buildings may reduce social interaction, increase isolation, and intensify feelings of loneliness [4]. However, a wider network of neighborly relations may enhance social cohesion, improve sense of belonging, and reduce loneliness [4].

The number of multi-storey residential buildings is also increasing in Uzbekistan. Local scholars emphasize the importance of climate conditions, wind direction, and solar radiation in architectural planning. For example, in desert zones of Tashkent, closed courtyard structures that protect against dust storms are recommended, while in oasis and foothill areas, semi-open courtyard layouts are suggested [5]. The minimum distance between buildings should ensure sunlight exposure: 25 m for 4-storey buildings and 40 m for 9-storey buildings, as 2.5 hours of sunlight is considered sufficient for sanitary sterilization [5].

Materials and Methods. The study employed a review of scientific literature and comparative analysis. First, international and local publications on living quality in high-rise residential buildings were collected. The reviewed research introduced measurement methods and criteria encompassing environmental, acoustic, safety, and social factors.

Scientific articles, conference materials, and guidelines from countries such as China, Belgium, Vietnam, and Hong Kong were examined. In addition, normative documents and academic works related to residential buildings in the context of Uzbekistan were analyzed [5].

Results. The living quality of high-rise residential buildings is evaluated through the following key criteria:

Thermal comfort and air quality: An optimal indoor environment is defined by air temperature, humidity, and air circulation. Proper ventilation, humidity control, and the opportunity for occupants to regulate temperature and airflow are necessary [6]. Ventilation systems may be natural, mechanical, or hybrid; for example, the cavity between double-layer glass façades enables natural ventilation and a “solar chimney” effect, reducing energy consumption [5].

Daylighting and solar exposure: Proper planning of distances between buildings ensures sufficient sunlight penetration into apartments; in Uzbekistan, a gap of 40 m between 9-storey buildings is recommended to achieve 2.5 hours of sunlight exposure, which is considered adequate for sanitary sterilization [5]. Natural light has a positive influence on human health and psychological well-being [3].

Noise and acoustics: Noise can severely affect human health; according to the World Health Organization, noise levels above 40 dB(A) are considered hazardous [6]. The location of residential buildings should reduce noise from traffic sources, and acoustic barriers (including double-layer glass façades) should be applied. The cavity between façade layers contributes to noise reduction in addition to providing thermal insulation [7].

Air pollution and water quality: Healthy buildings must provide clean air and water, prevent excessive humidity and mold formation, and promote the use of low-emission construction materials [3]. A study in Hong Kong emphasizes that a healthy building must ensure potable water supply, appropriate wastewater disposal, and compliance with sanitation regulations [1].

Structural safety: A safe residential building must have structural integrity, properly installed engineering systems, and secure electrical and gas networks [1]. Evacuation corridors and emergency exits must be sufficient and clearly marked.

Site safety: Construction sites should be free from natural hazards such as floods, landslides, or tsunamis [1]. In addition, the surrounding environment should have low fire and traffic risk.

Management and operation: Research in Hong Kong found that health and safety performance largely depend on the efficiency of building management. Maintenance, cleanliness, and preparedness for emergencies have greater impact than architectural design alone. Therefore, indicators of building operation and management are included as a separate assessment category [1].

Layout and spatial dimensions: Proper spatial layout, adequate indoor areas, and sufficient storage spaces are important for living quality. A study conducted in China identified the size and diversity of outdoor spaces and functional flexibility as key evaluation measures [2].

Human comfort: Ergonomic design of interior spaces, placement of furnishings, and convenient mobile furniture improve resident well-being. The ability of occupants to control temperature, lighting, and airflow also defines comfort levels [6].

Social interaction: High-rise living often weakens social communication, leading to isolation and loneliness. However, research in Vietnam shows that a strong neighborhood network increases social coherence and attachment to place while reducing loneliness [4].

Communal spaces and communication areas: Community gardens, playgrounds, sports grounds, and shared rooms support social integration. Due to limited land, corridors and elevator lobbies often become informal social spaces, potentially threatening privacy and safety [4]. Therefore, dedicated communal zones should be incorporated in the design.

Health: Research in Belgium revealed a positive but weak relationship between self-reported health and building height: well-being improves up to the sixth floor and then stabilizes [8]. When socio-economic factors are included, the difference in health between building heights becomes insignificant. However, reduced physical activity and limited social networking among residents of higher floors may serve as negative factors [8]. Therefore, the creation of stairs for daily use, sports infrastructure, and green areas is recommended.

Evaluation methods are designed to measure different criteria. Some examples include:

Surveys and Likert scales: User needs and satisfaction are measured using 5- or 7-point scales. In a study in China, a 5-point survey covering 24 elements was used, and factor analysis confirmed a six-dimensional model [2].

Expert evaluation and the Analytic Hierarchy Process (AHP): The BHHI and BSCI indices in Hong Kong were developed to systematically assess building health and safety. Experts assigned weight coefficients to factors such as architectural design (layout, height, noise barriers), building services (ventilation, elevators), outdoor environment (air quality, acoustics, thermal comfort), and building operation [4].

Structural Equation Modeling (SEM): A study in Vietnam used SEM to analyze psychological components of living quality such as neighborhood networks, social cohesion, and place attachment. The integration of surveys and architectural drawings helped to identify relationships among variables [4].

Environmental measurements: Physical indicators such as noise levels, air quality (PM_{2.5}, SO₂, CO₂), thermal zones, and radiation are used to determine environmental comfort. The results allow adjustments to architectural layouts and materials [6].

Comparative analyses. China and Uzbekistan: In the Chinese study, the quality of outdoor spaces was assessed through a multi-dimensional questionnaire method, and the results demonstrated that sustainability and safety were of the highest importance. In contrast, construction regulations in Uzbekistan emphasize solar exposure and wind

direction as primary criteria; therefore, ecological factors receive greater attention in the local context [5].

Hong Kong and Vietnam: The BHHI/BSCI indicators developed in Hong Kong stress the management aspects of health and safety; proper building operation was found to be more critical than design itself [1]. In Vietnam's case, social integration and community relations play a leading role—communal spaces and strong neighborhood networks enhance residents' satisfaction and sense of belonging [4].

Demographic analysis in Belgium shows a weak but positive correlation between building height and self-reported health, suggesting that high-rise living does not significantly harm residents' well-being [8].

Innovations and development trends.

Double-layer glass façades: In European and Asian countries, double-layer glass façade systems are being implemented. The cavity between the two glass layers functions as a buffer that reduces heat transfer and noise; warm air is retained during winter, and hot air is ventilated out during summer, contributing to energy savings. Their advantages include reduced energy consumption, improved thermo-acoustic comfort, increased natural lighting, and greater architectural design flexibility [7].

Green construction and sustainable materials: The use of energy-efficient technologies, solar panels, rainwater harvesting systems, and low-emission building materials contributes to improved living quality [3].

Communal and multifunctional spaces: Community gardens, playgrounds, green areas, and multifunctional rooms strengthen social integration [4].

Digital technologies and smart homes: Solutions such as automatic control of air and temperature through sensors, energy-efficient operation of elevators and engineering systems, and digital monitoring of security systems enhance comfort and convenience for residents.

Conclusion. The living quality of high-rise residential buildings depends on a combination of multiple factors. Environmental parameters—thermal comfort, ventilation, natural lighting, noise control, and air quality—directly influence human health and well-being [6]; safety, including structural stability, emergency evacuation, and environmental hazards, is equally essential. Psychological components of living quality—such as social interaction, community attachment, and self-perceived health—are influenced by spatial organization and the availability of communal areas. The combined application of different methodologies (surveys, AHP, SEM, and environmental measurements) provides a comprehensive understanding of living quality. Research demonstrates the necessity of coherence between architectural design and operational management, with management systems playing a particularly significant role in living conditions [1].

In the context of Uzbekistan, planning strategies that consider solar exposure and wind direction, maintaining minimum distances to ensure 2.5 hours of sunlight, and constructing courtyard layouts that protect from dust storms are highly important [5]. At

the same time, international practices such as double-layer glass façades, communal spaces, and smart technologies may help create more comfortable residential environments. Future research should develop local assessment systems tailored to Uzbekistan's climatic and sociocultural characteristics, conduct post-occupancy evaluations with resident participation, and establish scientific foundations for effective building management and maintenance.

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