

PREFABRICATED CONSTRUCTION IN THE RESIDENTIAL REAL ESTATE MARKET

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ARTICLE INFO	ABSTRACT
Keywords: prefabrication, housing, sustainable development, housing gap, real estate market	Persistent housing shortages and escalating housing investment costs in numerous countries drive the search for technologies that enable faster, cost-effective housing development. Prefabrication technology has emerged as a promising solution, which enables buildings to be constructed in significantly shorter timeframes compared to traditional methods. This approach utilizes prefabricated structural elements manufactured in controlled factory settings, leading to a substantial reduction in the carbon footprint associated with the construction process.
JEL Classification: O18, P23, P26, P30, Q01, R21, R31	This study focuses on two primary objectives: 1) Identifying the key factors for integrating prefabricated construction technology into the multifamily housing market, especially within the framework of sustainable development policies and the growing housing gap, and 2) Examining buyer preferences to assess their openness toward prefabricated construction in the multifamily residential market. Identification of the determinants of the implementation of prefabricated technology was carried out based on comprehensive literature review and critique of source documents. Additionally, buyer preference surveys were conducted among residents in post-communist Central and Eastern European countries (Poland, Bulgaria, and Ukraine).
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1. Introduction

Prefabrication in construction involves producing structural elements or building modules in controlled factory settings, which are later transported and assembled on-site. Tracing back to antiquity, early forms of prefabrication were seen when Roman builders utilized composite materials, resembling modern concrete, made from lime, gypsum, water, stone aggregate, and volcanic ash from Vesuvius. A significant milestone in prefabrication was the

invention of modern concrete using Portland cement in 1824 and the first use of reinforced concrete components, initially for mesh-reinforced flowerpots by the head gardener of Paris. Le Corbusier's 1914 Dom-Ino House design marked another advance, proposing a three-level structure with rectangular concrete slabs supported by slender columns. Although unrealized, this concept inspired future architects (Rybarczyk, 2022; Runkiewicz et al., 2020). Throughout the 20th century, prefabrication primarily advanced in

France, Sweden, and Finland (Borek & Szulc, 2022).

In Poland, the first prefabrication plant was established in 1897 in Białe Błota, near Bydgoszcz, which still operates today. The peak of prefabrication in Poland was during the 1970s and 1980s, enabling the annual construction of over 250,000 housing units (283,600 in 1978) through mass prefabrication technology. The large panel prefabrication system offered practical advantages, allowing the implementation of standardized systems, like the WUF-T or OWT-67, which used typical prefabricated elements for efficient, uniform structures suited for rapid and affordable construction (Cholewicki & Derkowski, 2014). Many other countries adopted similar methods to expand housing stocks quickly and improve housing conditions. It is important to note, however, that the primary aim of prefabricated construction during this period was to maximize the number of housing units, often at the expense of quality. Haste, chronic shortages of adequate quality building materials, and poor-quality installation and finishing work on the construction site led to numerous defects, including poor sound and energy insulation. Construction conglomerates, or "house factories," producing prefabricated elements for residential buildings, operated in Poland until the late 20th century. Construction conglomerates were manufacturers of prefabricated elements - so called large panels - and the main developers of residential complexes in Poland during the 1970s and 1980s. House factories are "plants producing elements for the rapid assembly of buildings". During this period, prefabrication technology also expanded into other construction sectors, especially industrial and commercial buildings sectors (PWN, 2024).

Experiences from Belgium, France, Germany, Sweden, the United Kingdom, and Japan indicate that prefabrication technology continues to advance, delivering sophisticated, functional, and durable solutions that often go beyond basic structural components, providing ready-to-use modules with complete utility infrastructure (heating, plumbing, water, and electrical systems). Prefabricated units can be quickly assembled on-site and, after use, can be disassembled and relocated. Globally, prefabrication technology is employed in diverse projects, with large panel prefabrication systems seeing a revival. This trend is evident in countries worldwide, from Canada and the United States to the United Kingdom, Germany, Kazakhstan, and Singapore. In Russia, prefabrication primarily supports affordable housing, while in some

developed countries, it is also applied to exclusive properties (Albus, 2018).

The housing gap is a persistent global challenge. One approach to addressing this issue is to use cost-effective and/or time-efficient technologies, such as prefabrication. However, public perception significantly affects its development. Therefore, many researchers contend that governments should prioritize promoting prefabrication technology among developers and provide financial support to their projects rather than assisting homebuyers directly. Developers, in turn, can lead efforts to familiarize and engage clients with prefabricated construction (Dixon-Ogbechi & Adebayo, 2020). In Korea, prefabricated houses are often associated with low-cost container housing, creating a negative perception. However, this view is mistaken, as prefabricated buildings, while more affordable and faster to construct, meet established standards and differ markedly from low-end housing. Efforts to support prefabricated construction in Korea are advanced not only at a national level but also by the governments of Australia and New Zealand (Yoo, 2015). In India, public perception of prefabricated construction quality is less impactful due to the country's significant housing shortage and the poor living conditions faced by much of the population. This situation prompted the Indian government's "Housing for All" initiative, targeting the construction of 20 million affordable public housing units to address the housing needs of the urban poor, including slum residents (Chippagiri et al., 2021). In Ghana, where the population has grown nearly fivefold over the past 60 year, hence creating significant challenges, especially in ensuring adequate housing, the state has formulated housing policies that include fostering new sustainable construction technologies, including prefabricated buildings (Ministry of Works and Housing, Republic of Ghana, 2015). Social and economic challenges, however, continue to complicate housing initiatives in Ghana, with middle-income residents showing interest in prefabricated houses only if they are cheaper, quicker to build, and of higher quality (Essienyi, 2011). Japan also sees strong interest in prefabricated construction due to the necessity for rapid housing reconstruction in the wake of frequent earthquakes. The 2011 Great East Japan Earthquake (GEJE) exemplifies the damage that natural disasters can cause, having triggered a tsunami that destroyed the Fukushima nuclear plant. Eight years after the disaster, approximately 52,000 people were still searching for new houses, with the number now around 20,000.

Japan is now facing not only recovery from GEJE, but also preparations for future large-scale disasters and the rapid repair of disaster-related damage, which includes the development of quick prefabricated construction solutions (Shiozaki, 2018). In the United Kingdom, studies indicate that resistance to prefabricated housing projects is largely due to previous large-scale, standardized prefabrication attempts. Clients are more concerned with the final product outcome than the technology itself (Laing et al., 2001; Maslova & Burgess, 2023).

Hence, the objectives of this study are: 1) Identifying the key factors for integrating prefabricated construction technology into the multifamily housing market, especially within the framework of sustainable development policies and the growing housing gap, and 2) Examining buyer preferences to assess their openness toward prefabricated construction in the multifamily residential market. Identification of the determinants of the implementation of prefabricated technology was carried out based on comprehensive literature review and critique of source documents. Additionally, buyer preference surveys were conducted

among residents in post-communist Central and Eastern European countries (Poland, Bulgaria, and Ukraine). The survey was conducted in 2019, the last year of stability before the impact of unpredictable socio-economic events such as the COVID-19 pandemic and the armed conflict in Ukraine. These events significantly disrupted the real estate market in Central and Eastern Europe and shifted perceptions of residential properties among potential buyers.

2. Material and methods

Addressing the research problem and achieving the objectives involved several steps, illustrated in Figure 1. Identifying the determinants of the implementation of prefabricated technology in the multifamily residential real estate market required a comprehensive analysis of the pros and cons of prefabricated construction and an evaluation of its feasibility within the framework of sustainable development and the widening housing gap in Europe. This was done using the method of analyzing and critiquing source documents from publicly available source databases and scientific publications.

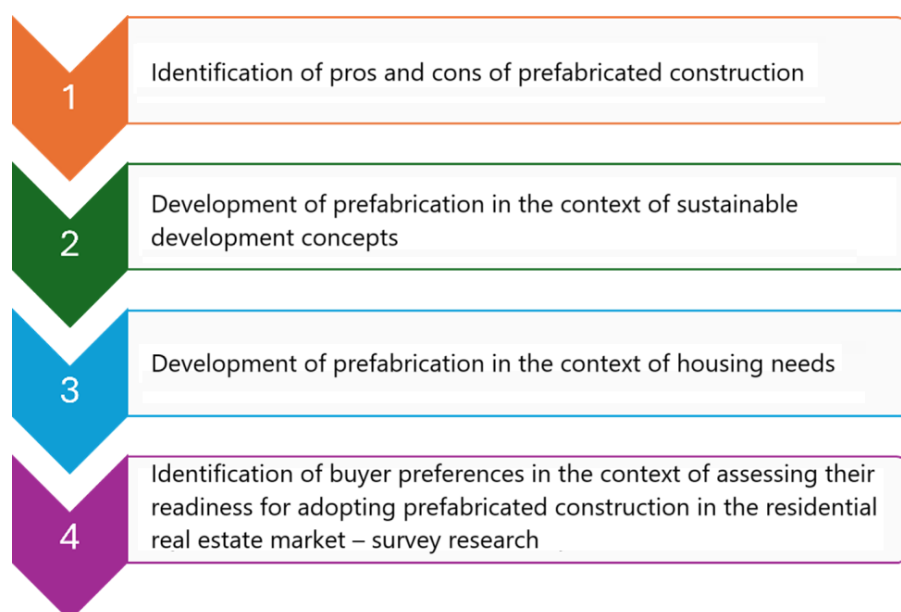


Fig. 1. Scheme of the research. *Source:* own study.

The examination of buyer preferences regarding the acceptance of prefabricated housing in the multifamily market relied on a survey, targeting data collection from selected respondents. Conducted in 2019 across three Central and Eastern European countries, i.e. Bulgaria, Poland, and Ukraine - the survey represented the last period of stability before unforeseen socio-economic events, such as the COVID-19 pandemic and the armed conflict in Ukraine, which significantly

impacted the real estate market in Central and Eastern Europe and altered public perceptions of residential properties.

The survey utilized a custom-designed questionnaire with closed-ended questions, including an introductory section explaining the study's purpose and completion instructions. It contained two closed-ended questions on residential property buyers' preferences and five demographic survey questions,

providing insights into the respondents' demographic, social, economic, and locational characteristics. The study group was intentionally selected to enable an assessment of buyer preferences based on nationality. The choice of countries for the study was deliberate. Poland, Bulgaria and Ukraine are post-socialist countries located in Central and Eastern Europe, where prefabricated multifamily residential construction saw significant development in the second half of the 20th century. A quota sampling method (purposeful, non-random sampling) was used to select respondents. The survey sample reflected the gender and age distribution of the study area's residents. The selection of survey respondents and the lack of structural differences allowed the study to be representative of the general population.

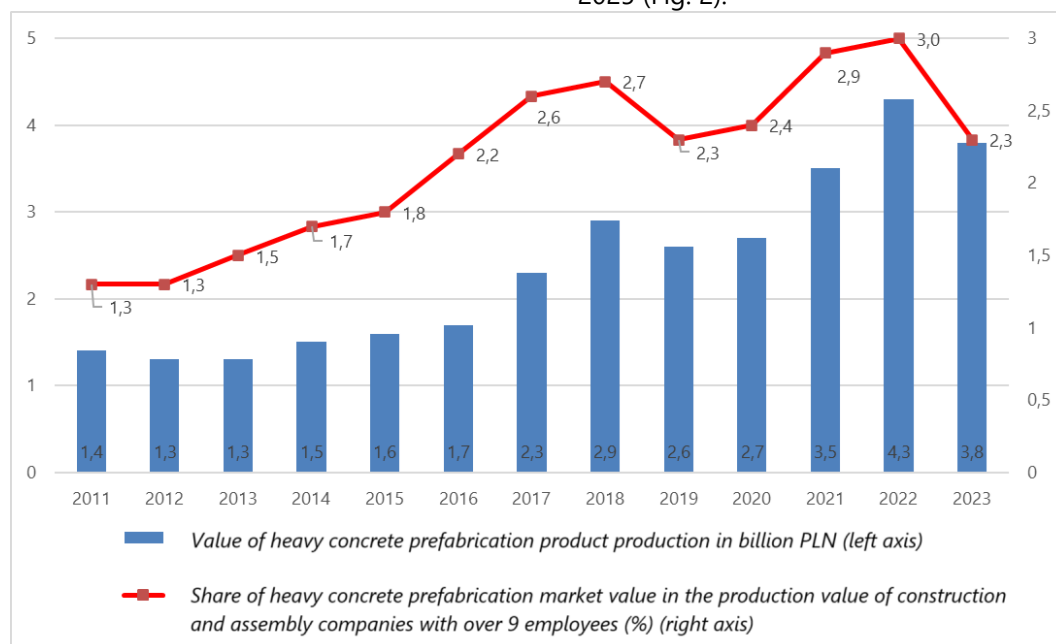
The survey questionnaire was disseminated electronically as an online survey, with links sent via remote communication channels. Regarding confidentiality, the survey was conducted anonymously, with respondents completing the questionnaire independently. Completed questionnaires were checked for proper completion (incomplete responses were excluded) and then digitized. Data analysis allowed for their presentation and the drawing of conclusions.

3. Results and discussion

3.1. Implementation of prefabrication: advantages and disadvantages

Construction prefabrication technology has evolved into three primary types: 1D prefabrication – characterized by single prefabricated reinforced concrete and steel elements, such as footings and sill plates, columns, beams, etc., used primarily in timber frame construction; 2D prefabrication – a panel system that commonly includes prefabricated walls, floors, stairs, balconies, and entire roof trusses assembled on-site, especially used in the large panel system and high-rise housing; and 3D prefabrication – modular construction with large, ready-to-assemble modules typically made of steel and timber, comprising at least floors, ceilings, walls, utilities, and pre-installed joinery (Sulik & Zawisław, 2021). Modular technology is currently non-standardized, as each manufacturer uses proprietary systems. Additionally, modern 3D printing allows for the production of prefabricated components, often comprising entire building floors or segments, significantly reducing both construction time and costs.

Expert analysis estimates that Poland's heavy concrete prefabrication market - including footings, sill plates, columns, beams, and stairs produced by the 50 largest manufacturers - was valued at approximately 3.5 billion PLN in 2021, exceeding 3.8 billion PLN in 2023 and projected to reach close to 5 billion PLN by 2025 (Fig. 2).



Note: 2022 – estimate; 2023 – forecast

Fig. 2. The market for heavy concrete prefabrication in Poland. Source: Spectis (2024).

Modular prefabricated construction offers a substantial time advantage over traditional methods

(studies suggest time savings of up to 50%), translating directly into lower costs and faster returns on investments. Below is a detailed comparison of

additional advantages and disadvantages that can influence an investor's choice of the construction method (Table 1).

Table 1

Advantages and disadvantages of modular prefabricated construction	
Advantages	Disadvantages
Rapid project completion (construction in prefabricated technology is approximately twice as fast as traditional methods).	Joint durability is generally lower than the prefabricated elements themselves.
Minimized on-site wet processes, reducing construction time.	Complexity of assembly.
Reduced weather-related construction delays.	Requirement for skilled workers and constant supervision for on-site connection works.
Capability to incorporate advanced techniques, such as prestressing of steel structures and concrete.	Numerous "weak spots" at material junctions, requiring thermal bridge elimination and sealing.
Flexibility for unique architectural designs, particularly with 3D printing.	Logistics are challenging—transporting large elements to the site can be costly and complex.
Precision and consistency in construction elements.	Planning and design phases require significant time investment.
Enhanced accuracy, difficult to achieve with traditional methods, reducing discrepancies between contractual and actual floor area.	Cost concentration within a short timeframe.
Enhanced quality of elements through continuous monitoring of production phases.	Limited design flexibility due to modular constraints.
Reduced labour demand, thus lowering construction costs (approximately 6% lower than similar masonry constructions).	Lack of possibility for individual changes in the functional layout of the flats.
Cost-effectiveness of system construction.	
Quick disassembly at the end of the building's lifecycle.	
Environmental benefits—recycling opportunities and repurposing production waste in new prefabricated elements.	

Source: own study.

The listed features of prefabricated construction, in terms of advantages and disadvantages, directly outline the factors for its application. Based on the selection criteria that a given project aims to achieve (for example, a shorter or longer completion timeline; a high or low standard of workmanship; whether it is a complex of buildings or a single supplementary structure; whether there are funding limitations or not), the investor makes the appropriate decision.

Prefabricated construction should also be assessed within the context of modern alternative building methods, particularly those focused on environmental sustainability. The technology of prefabricated materials is being developed alongside efforts to find new materials that are both cost-effective and energy-efficient. Moving part of the construction process to factories allows for controlled material usage, reduced energy consumption, and a lower CO₂ footprint.

3.2. Development of prefabrication in the context of sustainable development

Many of the advantages of prefabrication outlined above align with the principles of sustainable development, particularly the goal of achieving zero-emission buildings, in line with the European Green Deal – Fit for 55 Package (European Council, 2024; PWC, 2022) and the circular economy model. The construction sector is one of the most emission-

intensive industries, responsible for significant environmental pollution and the excessive, irreversible consumption and degradation of the planet's most valuable resources, including water (European Council for an Energy Efficient Economy, 2024). This resource consumption affects all stages of a building's lifecycle, from design and construction through to usage and eventual decommissioning. Therefore, aiming first for a significant reduction and ultimately for the elimination of the carbon footprint (decarbonization) of building resources across their lifecycle (Life Cycle Assessment – LCA) requires addressing this reduction at two levels (ISO, 2006; PKN, 2014): the embodied carbon footprint, concerning the production of building materials and construction on-site, and the operational carbon footprint, associated with the building's usage phase.

Given the complex, multi-tiered, and multi-stakeholder chain of cooperative links involved in the construction and operation of buildings, these decarbonization efforts entail a complex process of identifying and measuring the total carbon footprint, involving the analysis of CO₂ emissions across the entire value chain of a given building. This is currently being implemented by leading entities in the construction and real estate sectors. Two essential areas related to construction and prefabrication technology should be considered: the design and construction of new buildings, and the modification of

existing assets. The former area is relatively well understood and applied in practice, especially in the commercial real estate sector (office buildings, warehouses, retail spaces, etc.), contrasting with the residential sector, where - according to data from the Statistics Poland (GUS) on the construction methods used in residential buildings in recent years—prefabrication technology is employed on a minimal scale (Fig. 3).

A considerably greater effort will be required to address the emissions from the extensive stock of existing buildings, which will be undertaken within the scope of the aforementioned Life Cycle Assessment – LCA, as highlighted by numerous experts, including those from the World Green Building Council (2022; 2023a; 2023b; 2024).

This issue is of particular significance, as it affects a vast number of buildings and residential units. Preliminary findings from the 2021 National Census of Population and Housing indicate that Poland contains 15.34 million housing units across approximately 6.95 million buildings, of which 6.36 million are single-family houses and 558.4 thousand are multi-unit buildings. In multi-unit buildings, there were 8.61 million housing units, with nearly 4 million of these, housing approximately 12 million people, built using large panel prefabricated system (2D) (Statistics Poland, 2022). According to JLL experts, up to 97% of existing buildings in Poland require substantial modernization to significantly reduce or fully eliminate their carbon footprint (JLL, 2023) (Fig. 4).

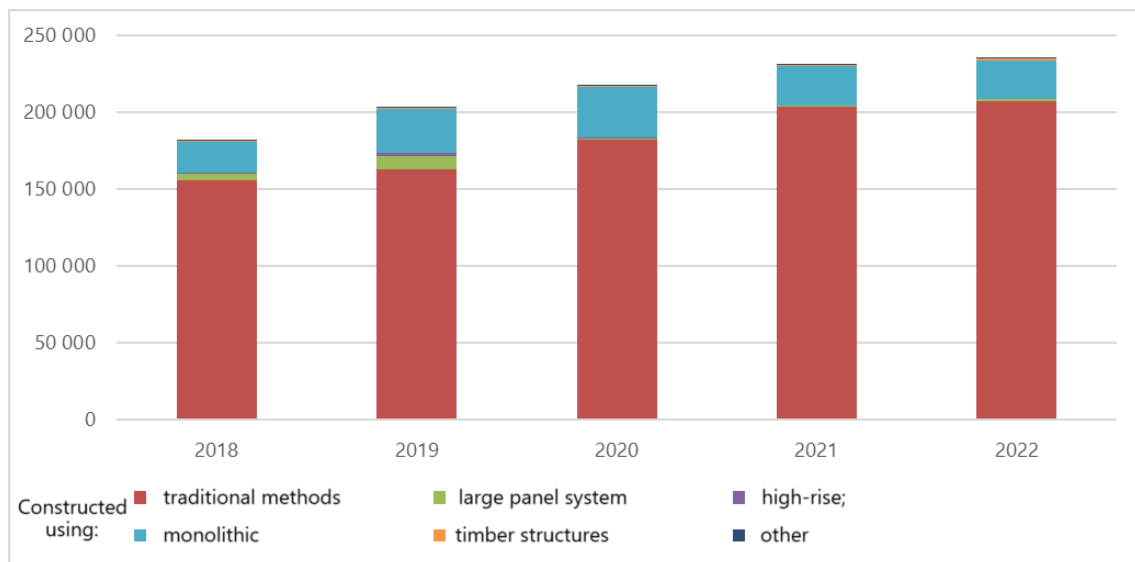


Fig. 3. Structure of the number of residential buildings constructed in Poland from 2018 to 2022 by construction method (units). *Source:* own study based on the Statistics Poland (2023).

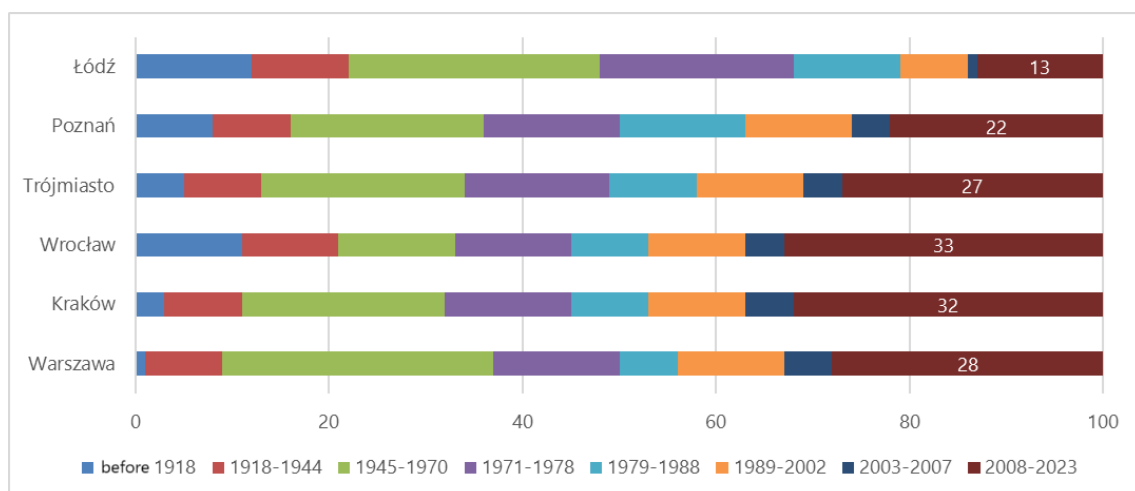


Fig. 4. Age structure of housing stock in selected cities in Poland (%). *Source:* own study based on JLL (2023).

3.3. Development of prefabrication in the context of housing needs

Ongoing unmet housing needs and rising housing investment costs encourage the exploration and

application of technologies that allow for rapid and economically viable residential construction. In Central and Eastern European countries, from the end of World War II until the late 1980s and early 1990s, the region's landscape shifted from rural to urban, with the proportion of the population living in urban areas increasing by about half under central planning (Szymańska & Matczak 2002, pp. 39–40). Governments in these countries sought to bridge the housing gap primarily by employing large panel prefabrication system. However, over time it became evident that the so-called "house factories," which produced large prefabricated elements for residential buildings, had not been modernized, and large panel system structures frequently had defects (such as using less effective substitutes for specified materials, errors in technological solutions, poor quality of prefabricated parts, damage during transport and storage, construction flaws, etc.). Housing policy therefore

prioritized quantity over construction quality (Rącka, 2013).

The housing shortage was not resolved before the political transition. Much like Western Europe, Central and Eastern Europe still faces the challenge of the housing shortage, or the so-called housing gap (Sobolewski & Zatryb 2024) (Figure 5). It is essential to construct affordable housing, which is crucial for addressing the crisis in maintenance costs. A lack of accessible housing can lead to housing insecurity, inadequate living conditions, financial strain, and even homelessness. Countries particularly at risk of overcrowding include Albania, Montenegro, Macedonia, Romania, Serbia, Turkey, and, to a lesser extent, Bulgaria and Poland (Figure 6). In these countries, the overcrowding rate among people living below 60% of median equivalized income exceeds 40%, while the long-term goal is a rate of 6%, reflecting the average of the best European indicators in this area.

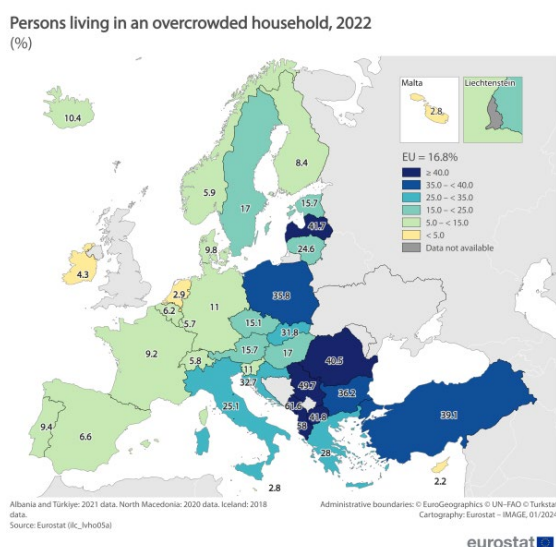


Fig. 5. Overcrowding rate in EU countries. Source: (Eurostat, 2022).

The first clearly visible issue is that the existing prefabricated stock, built in the 1970s and 1980s, now requires renovation. The gradual increase in technical requirements and lifestyle changes have made pre-transition panel buildings outdated in terms of both construction (external walls, roofs, window and door openings, systems) and functionality (Sobolewski & Zatryb, 2024). Older prefabricated structures have a limited structural lifespan and require structural stabilization, insulation of external walls, widening of openings, and upgrades to systems in line with current energy efficiency requirements (Minarovičová & Mend'an, 2013). Energy inefficient resources are found

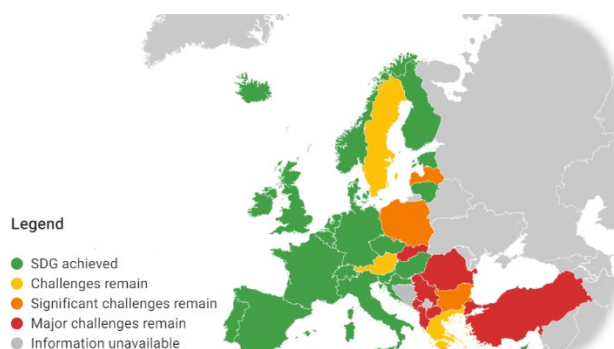


Fig. 6. Overcrowding rate in the EU among people living below 60% of median equivalized income. Source: Lafortune et al. (2024).

not only in CEE countries, but also in Western Europe, e.g. in Italy, e.g. in the Lombardy region, where more than 60% of the existing building stock has been built before the 70s. (Salvalai et al., 2017). Another pressing issue is the housing deficit, which is increasing among the poorer segments of the population.

Addressing the housing gap requires low-cost and quick-turnaround housing that can meet the housing needs of the poorest populations. Modern prefabricated buildings use lighter materials and have a smaller environmental impact than conventional buildings, both in terms of pollution and the consumption of non-renewable natural resources

(Tavares & Freire, 2022; Mao et al., 2013). Some researchers argue that traditional house construction methods are inefficient and do not meet the quality expectations of governments and society (Zhang, 2012). This is currently a controversial point of view, as prefabricated construction is not effective for individual projects, but may be perceived completely differently by governments (including local ones) in the case of repeatable projects, in which the scale effect makes such investments highly profitable. However, researchers often point out that prefabricated construction can effectively address the challenges facing the construction sector. Implementing these innovative solutions can enable the industry to contribute to positive change and support sustainable development (Narváez et al., 2024).

3.4. Buyers' preferences – survey findings

The economic viability of prefabricated technologies does not always influence prospective buyers' decisions when choosing a flat. It has been noted that in Central and Eastern European countries, as well as in the United Kingdom, prefabrication is still associated with large panel system buildings, evoking perceptions of low quality and uniformity (Egedy, 2000; Shahpari, 2020). As a result, this study aims to identify buyer preferences by assessing their openness to incorporating prefabricated construction within the multi-family residential property market. To achieve this goal, a survey was conducted in Central and Eastern European countries (Poland, Bulgaria, Ukraine) in 2019 among individuals interested in purchasing a flat, with 805 respondents completing the questionnaire. The research was conducted until the pandemic, and it was not continued due to the Russian invasion of Ukraine, which completely changes the Ukrainian buyers' perspective and therefore the data obtained in the study would not be comparable. In addition, the Ukrainian government and ministries have been working to define the principles of reconstruction, and in connection with their plans to access the EU, these principles must meet European criteria, such as energy efficiency of buildings and the European Green Deal – Fit for 55 principles. The questionnaire included two questions: 1. Do you value a flat in a traditional multi-

family building more than a comparable flat in a prefabricated building (block of flats) located in the same area? 2. Which building technology do you consider most desirable when buying a flat? Please rank the technologies from least to most desirable. The survey results are presented in Figure 7 (question 1) and Figure 8 (question 2).

Responses to the first question showed variation based on respondents' country of residence. Bulgarians showed a reluctance to pay a premium for flats in prefabricated housing estates, which are often associated with socialist-era construction. This may be due to the highly urbanized nature of Bulgarian housing estates, where areas are densely built up and, despite being equipped with retail, service, and public facilities, there is a noticeable lack of open public spaces. Furthermore, Bulgarian construction has not invested in innovative, modern prefabricated solutions. As a result, respondents associate prefabrication technology exclusively with post-socialist era construction.

In Poland, however, there is less tendency to devalue post-socialist housing. Respondents appreciate the quality of the urban spaces where prefabricated residential buildings were developed: designed according to the urban and architectural principles of the time, these housing estates were intended as open areas to meet residents' social and economic needs, equipped with service infrastructure (shops, service points, including public services: schools, clinics, libraries), social facilities (community clubs), and sports amenities (sports fields, sports halls).

The opposite trend exists for new gated estates, as Poles clearly favor open spaces and, therefore, are not inclined to pay a premium for new flats in enclosed enclaves compared to those in open areas. In Bulgaria, however, such gated flats are seen as worth a higher price, linked to residents' increased sense of security in gated estates. Compared to other EU countries, Bulgarian residents view their surroundings as less safe, with nearly one in five reporting crime in their neighborhood (Eurostat, 2022). By contrast, residents in Poland feel very secure in their localities (Poland's crime rate per 100,000 residents is one of the lowest in the EU).

Which type of building environment is most desirable to you when you buy a flat? scale of 1 to 5, from the least (1) to the most desirable (5)

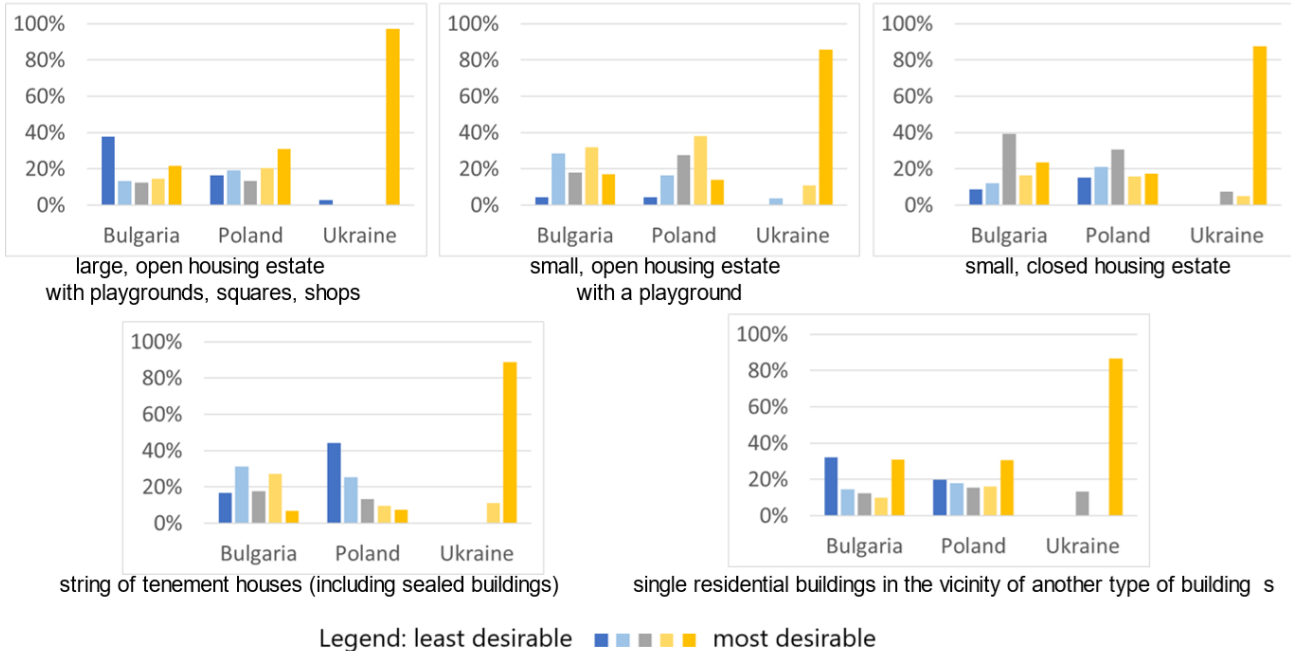


Fig. 7. Preferences for housing estate types in selected CEE countries. Source: own study.

Which of the building technologies is most desirable to you when you buy a flat? scale of 1 to 5, from the least (1) to the most desirable (5)

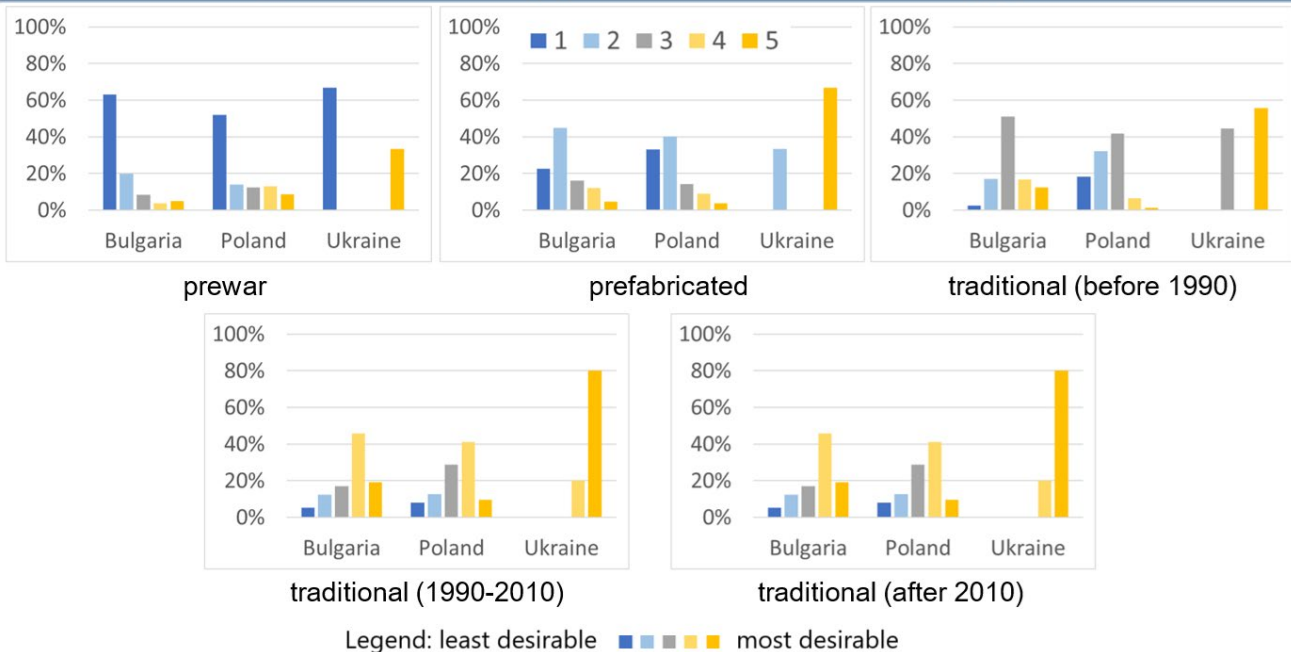


Fig. 8. Preferences for housing estate types in selected CEE countries. Source: own study.

Survey results from Ukraine are more challenging to interpret. Generally, Ukrainians (in surveys conducted before the war) were willing to pay more for flats in any type of building, with the highest premiums declared for flats in organized, open estates, which in Ukraine are often prefabricated. Importantly, however, Ukraine is characterized by high levels of housing deprivation and low housing affordability. Even before the war, Ukraine was marked by property prices that were unaffordable for the majority, especially in major cities. Given the unmet housing needs, Ukrainians appear less selective than respondents in other CEE countries and, provided they had the purchasing power, would buy any available flat (Fig. 7).

The second question aimed to identify which construction technology was most desirable among respondents. In Poland and Bulgaria, the most desirable buildings were those constructed using traditional methods after 1990. The least desirable were pre-war and prefabricated buildings (Fig. 8). Analysis showed that in Ukraine, the least desirable construction type was pre-war, associated with very low quality, whereas prefabricated large panel system buildings were not viewed as negatively as in the other analyzed countries. A strong indicator of these findings is the high demand for flats in Comfort Town, a 40-hectare post-industrial district in Kyiv. This low-cost project was developed by the Ukrainian architecture firm Archimatika. The estate was comprehensively designed – residents have access to shops, kindergartens, schools, dining facilities, a library, a gym, a swimming pool, and public spaces. The blocks of flats are prefabricated buildings made up of modules with pitched roofs, painted in pastel colors. This district has recorded the highest number of property sales in Ukraine. Before the escalation of the war in Ukraine and Russia's invasion in 2022, Comfort Town was home to nearly 20,000 residents (Bortolotti, 2022).

4. Conclusions

In the face of the ongoing climate and energy crisis, increasing focus is being placed on construction and its environmental impact, as well as on identifying effective measures to achieve the European Union's ambitious goal of Climate Neutrality by 2050. Many experts stress that construction must undergo a fundamental transformation to minimize its environmental impact. Without radical corrective measures, this sector is expected to double its total carbon footprint by 2060. Carbon dioxide reduction and environmental initiatives have thus become

essential business imperatives for climate protection, targeting all market players, including companies, organizations, cities, and local authorities (Siemińska, 2023; Masood et al., 2021; Jia et al., 2021).

This trend aligns increasingly with the growth of prefabrication technology in construction, in particular:

- 1) The technology of prefabricated materials is being developed alongside efforts to find new materials that are both cost-effective and energy-efficient.
- 2) This form of construction is already well established, with annual growth in the production of heavy concrete prefabrication products in Poland. However, this growth has yet to translate into a higher adoption of this technology in residential construction.
- 3) In Western Europe, as well as in Asian countries and the United States, prefabricated construction is considerably more popular than in Central and Eastern Europe. According to Deluxe Modular 84% of new single-family houses in Sweden are built using prefabrication technology (mainly with timber components), while the proportion is 5% in the USA, 9% in Germany, 20% in the Netherlands, and 28% in Japan.
- 4) The low utilization of modular prefabrication in Poland and Bulgaria, particularly in residential developments, may stem from a negative perception of this type of construction, associated in both countries with post-socialist architecture. Survey findings suggest that Ukrainians held a more lenient view of this type of construction, appearing less selective in the context of unmet housing needs (the survey was conducted before the war) than respondents from other CEE countries. With sufficient purchasing power, they would buy any available flat.

Furthermore, prefabricated construction, similar to modular construction, could play an essential role in rebuilding housing or service infrastructure destroyed by warfare or natural disasters (such as the floods in Central European countries in 2024, including Poland, the Czech Republic, Slovakia, Romania, Hungary, and Austria), due to the speed with which buildings can be erected from pre-manufactured components.

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