

VARIANT ANALYSIS OF THE OWNERSHIP STRUCTURE OF LAND INTENDED FOR SINGLE-FAMILY HOUSING

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Abstract

The most frequently preferred solution for the ownership structure of land for single-family housing in Poland is the structure of one cadastral plot – one single-family building. However, changing architectural concepts allow for the creation of single-family housing estates in systems consisting of atrial houses or T-type buildings, which have much more advantages than traditional terraced or semi-detached buildings. These advantages result from a different solution of building forms, which can be combined not only in rows, but also in variously shaped groups consisting of many houses. This provides greater possibilities for the free shaping of development plans for groups of houses, which in turn can be combined in various spatial arrangements while maintaining the required conditions of individual entrance, proper lighting of rooms and mutual distances. At the same time, it allows for more intensive use of the area. Despite the indicated advantages, in the light of the observed implementation practice, it seems problematic to locate buildings with separate ownership, used individually on a plot of land used jointly. The article analyzes the possibilities of legal solutions in the area of land and buildings that can be applied in such a solution. The strengths and weaknesses of each solution were assessed and their opportunities and threats were indicated. For the purposes of this research, four differently shaped groups of buildings consisting of T houses were selected. The results were presented in a SWOT analysis for the development variants adopted for the research using the T house as a repeatable residential unit.

The article proposes four legal and neighborly solutions that enable and promote the construction of housing estates using highly intensive atrial development based on the T-house.

Keywords: land ownership, single-family housing, T-houses, Atrium houses, cadastre, architecture

1. INTRODUCTION

Cities occupy less than 2% of the Earth's surface [Liu et al., 2021], but generate about 90% of the global economy, consume more than 75% of energy, and are responsible for more than 70% of global carbon

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dioxide emissions [Chakraborty et al., 2022]. Construction, and in particular its part related to residential construction, is one of the most important branches of the economy for the country. It drives many industries related to both the investment process and the use of the constructed buildings, in particular residential buildings. The demand for additional housing is high in most countries due to the shortage of resources in this sector and rapid population growth [Wojtyszyn & Sobierajewicz, 2023]. To meet the demand for housing, new housing and additional development space are needed [Rajabipour, 2023]. A key element of regional development and economic growth is land use intensity, development and spatial distribution [Kuang et al., 2020].

In recent years, not only in Poland, the single-family housing market has recorded significant development in suburban areas due to increased migration from city centers [1]. The increase in the quality and importance of residential development blurs the differences between urban and rural plots [2]. This has an impact on the structure of private ownership and local government, because condominium ownership is often used to divide land into plots with single houses [3]. At the same time, the analysis of the ownership structure of historical housing resources in Vienna revealed the potential of analyses of urban space based on individual data for planning practice [4]. Insight into individual patterns of ownership and household use enables the adoption of a housing development strategy and increases the importance of selecting the typology of ownership of a residential premises, which may result in imposing the ownership right of a flat on the ownership of a residential property [2]. Paccoud [5] examined the distribution of real estate assets based on detailed data from the land register in Dudelange, Luxembourg and revealed the influence of developers and landowners on the shaping of the residential environment.

The analyzed publications lack references to legal solutions for atrial development, which is the most intensive form of single-family housing. The presented spatial and compositional layouts of type T buildings give rise to the need for a new perspective on legal and ownership solutions and methods of neighborly solutions. Legal and ownership solutions are also important because real estate buyers notice the difference in the planning conditions of the acquired building plots. According to the research by Krajewska and her team, higher values are assigned to those that have clearly defined development conditions [Krajewska et al., 2021]. Land without specific development conditions, in Poland covered only by the study of conditions and directions of spatial development, is assigned lower values [Krajewska et al., 2021]. The findings suggest presented by Malik [Malik, 2024], a negligible impact of integrated metropolitan strategy on local land-use policies. Competitive mechanisms of municipal spatial planning contradicting metropolitan authority visions exacerbate the crisis of spatial identities and residential cannibalism [Malik, 2024]. The presented research justifies the need to introduce the solutions proposed in this article into legal circulation.

Spatial planning in Poland is based on the Act of 2003 [Act 2003] and its implementing regulations. It should be noted that these regulations give a lot of freedom to municipalities, which bear the major burden of developing planning documentation and shaping the space. The main conceptual document here is the study of conditions and directions of spatial development (from 2026, general plans are to be introduced). The study covers the area of the entire municipality and serves as the basis for the development of local development plans. These plans are the foundation for the development of design documentation or works related to real estate management. It should be added that local spatial development plans must be consistent with the study, and in the future, with general plans. The current housing situation in Poland is diverse and depends on the area of the country. The development of this industry is also largely determined by the area of the country, its tourist potential, demographic factors, internal and external migration and many others. Nevertheless, in every area of Poland there is a visible need to build new, relatively cheap buildings intended for medium or long-term housing purposes. The solution to this problem may be the T-type buildings proposed in [6]. Their construction allows the

creation of various types of spatial arrangements resembling traditional dispersed construction, terraced housing or closed multi-family buildings. For individual spatial solutions, appropriate legal solutions regarding the ownership structure of the land and related buildings or premises are important.

The aim of the article is to analyze the possibilities of legal solutions in the area of land and buildings that can be applied to selected architectural solutions.

2. MATERIALS & METHODS

SWOT analysis, which has been a recognized method since the 1960s, was chosen as a method for comparing solution options [Learned et al., 1965]. It is a tool often used in development planning. Its components are: analysis of strengths, weaknesses, opportunities and threats (SWOT). SWOT analysis is an important tool supporting decision-making and is commonly used for systematic analysis of strategic situations and identification of constraints in the internal and external environment [Gao & Peng, 2011]. After identifying the factors influencing the achievement of the goal, the options were compared, which are based on strengths, eliminating constraints, using opportunities and counteracting threats [Dyson, 2004]. One of the versions of SWOT analysis was developed by Dealtry in 1992 [Dealtry, 1992]. According to him, its four steps are built on strengths, eliminating weaknesses, using opportunities and mitigating the effects of threats. The analysis provides a solid basis for developing specific strategies and actions aimed at maximizing the potential of the area, e.g. the Białystok University of Technology campus, to create attractive, functional pocket gardens [Gawryluk et al., 2024]. The SWOT analysis in this study was used to identify the advantages, disadvantages, threats and opportunities of variants of ways of shaping the legal structure of land and buildings in the atrial development on the T-house plan.

2.1. Single-family house construction of t-house

The article uses the concept of residential development, using single-story single-family houses with an area of 70-80 m² designed on a T-plan. This concept allows for the creation of interesting forms of urban development that harmoniously fit into the scale of a small town or suburbs, offering an alternative to the uniform linear development that has dominated Poland in recent years. Although these solutions are based on the use of a standard design, they provide the possibility of individualizing both the internal space and the external form of buildings and their layout. Even with strict requirements for lighting and communication access, these systems can be arranged in various ways, taking into account the terrain and the urban design.

The most characteristic feature of the T volume is the flexibility of spatial layout solutions while using a repeatable residential unit [7]. T units can be combined into multi-family complexes that can accommodate even several dozen apartments with direct access from the ground level. The layout can be both regular and free, thanks to the possibility of various arrangements resulting from the possibility of combining units on four sides. Thanks to the use of repeatable unit technology, which can be combined into various, unique layouts, small housing estates consisting of houses on a T-plan constitute a solution that takes into account not only economic parameters, but also aesthetics, individualization of space, ergonomics oriented to the needs of specific users, sustainable development and psychological aspects of living in housing communities. In principle, these layouts use the beneficial features of multi-family buildings (common design, spaces used together, common pedestrian and vehicular communication, common connections, lack of individual garages) while still constituting single-family housing. Such estates can be an alternative to the currently popular monotonous and regular terraced housing, while offering better living conditions, in accordance with the principles of sustainable

development.

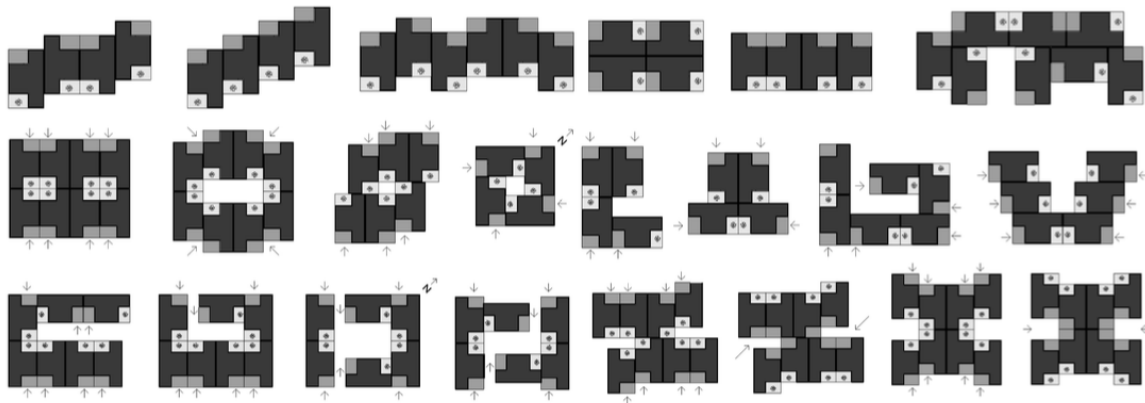


Fig. 1. Architectural idea and examples of arrangements of T-houses . Houses can be connected by internal walls in a traditional row system and in a double row system, where they are connected by an internal wall and through external walls. It shows also the possibility of parallel connection in one line, moving by the depth of the terrace (11 degrees – one house and 20 degrees – 2 houses). It is also possible to combine both systems.

Drawings: Alicja Maciejko

2.2. Ownership structure of land and buildings

There are many possible legal solutions for the T-House concept presented above. Starting from the traditional one with the allocation of individual plots for individual buildings and ending with a structure analogous to multi-family housing. The issues of ownership and co-ownership are regulated in Poland mainly by the Civil Code [8]. In the area of premises, the provisions of the Act on Ownership of Premises [9] should also be taken into account.

2.2.1. Traditional building-plot structure

A characteristic feature of this structure is the allocation of separate cadastral plots for individual T segments of buildings. Each T segment would constitute a separate cadastral building here. The boundaries between the sections would run along the expansion joints between such buildings. Such development would therefore meet the assumptions for single-family housing. Each building would constitute a component of a cadastral plot in which the ownership would be 1/1. Examples of architectural solutions illustrating this solution are presented in Figure 2.

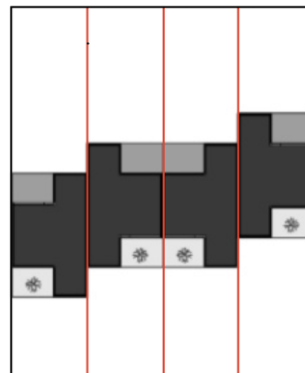


Fig 2. Division of real estate consisting in allocating a separate cadastral plot for each building (drawing: A. Maciejko, P. Hanus)

2.2.2. Co-ownership structure

The structure typical of joint ownership is a solution used for multi-family housing. The building is divided into residential premises that are owned separately. All T segments are located on one cadastral plot. The related right of joint ownership to the common parts of the building and to the land under the building is defined as the ratio of the usable area of the premises to the total usable area of the building. In such a system, each T-building would constitute a separate premises and the combined T segments would constitute one residential building. The ownership structure would look as follows:

- t-shape – premises, ownership 1/1;
- common parts of the cadastral building = $1/n$, where n is the number of T segments constituting the residential building;
- share in the land = $1/n$;

Examples of architectural solutions illustrating this proposal are presented in Figure 3.

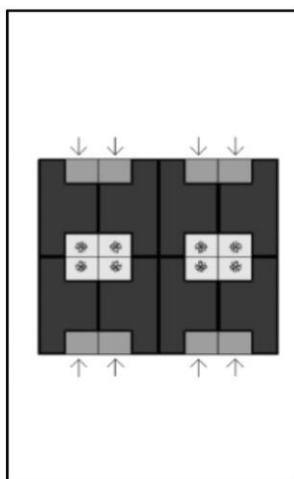


Fig 3. Joint ownership of the land and ownership of premises constituting a single T segment; 8 residential premises. Joint ownership of the land and common parts of the building $1/8$ each (drawing: A. Maciejko, P. Hanus)

2.2.3. Co-ownership structure with separate rights of use

The extension of the multi-family building concept is the possibility of using the co-ownership structure of the land without separating or with separating separate premises for each T segment. As in the second case, the segments are located on one cadastral plot. However, the loose structure of the segments allows in this case to allocate a plot for each of them to use (quoad usum division). This is not a cadastral division resulting in the separation of new boundaries and new cadastral plots, but only a division allowing the use of individual segments assigned to persons. This is shown in Figure 4.

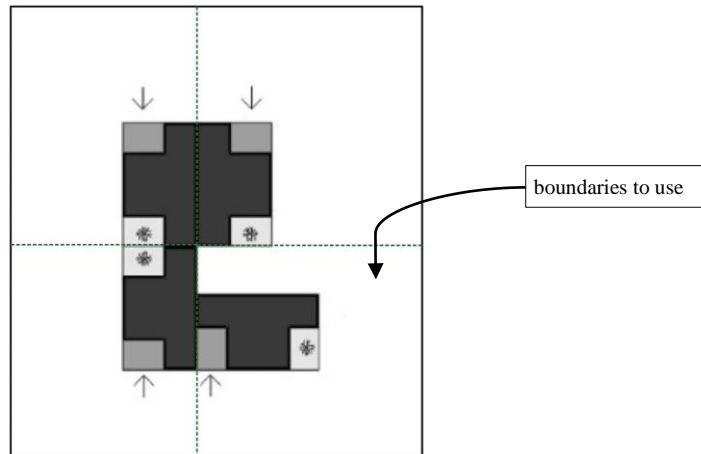


Fig 4. Division into the use of individual T segments and a part of the plot, (drawing: A. Maciejko, P. Hanus)

The above concept implemented using the separate premises of individual segments will look identical in the ownership structure to that presented in point 3.2. The lack of separation of premises will result in the co-owners of the land being simultaneously co-owners of each T segment, and the right to use a specific segment will be guaranteed by the *quad usum* division. It should be emphasized that the agreement on the division of real estate for use may be concluded in any form, the regulations do not impose any requirement in this matter. The provisions of the Civil Code in art. 206 only regulate the general possibility of such division [8]. Nevertheless, in the case of concluding an agreement in the form of a notarial deed, the parties will have the possibility of disclosing this agreement in the land and mortgage register of the joint property [10]. The *quad usum* division is used in many situations, e.g. when designating a private garden, terrace, access to the building, parking spaces, or dividing a single-family building into separate floors for exclusive use.

2.2.4. Law within the framework of a housing co-op

According to art. 1 of the Act on Housing Cooperatives (Act, 2000), the purpose of such a cooperative is to meet the housing and other needs of members and their families by providing members with independent residential premises or single-family houses, as well as premises for other purposes.

Therefore, a solution consisting in the construction of T houses within a previously established housing cooperative is possible. Such a solution does not depend on the spatial layout of the buildings. Therefore, the layouts presented in each of Figures 1, 2 and 3 are possible here. This is due to the definition of a single-family house provided in [11]. According to it, a single-family house is a residential house, as well as an independent part of a semi-detached or terraced house intended primarily to meet housing needs.

This solution is only possible in a situation where all purchasers of buildings are members of a housing cooperative. The presented solution therefore requires the existence, and in practice the establishment of a housing cooperative.

A cooperative, in accordance with art. 1 of the Cooperative Law Act [12] is a voluntary association of an unlimited number of persons, with a variable personal composition and a variable share fund, which conducts joint economic activity in the interests of its members. In the analyzed case, the activity will be the construction and maintenance of residential buildings and the cooperative will be a housing cooperative. Each member of the cooperative using a single-family building will be the holder of cooperative housing rights.

3. RESULT

In order to assess the methods of shaping the legal structure of land and buildings presented in Chapter 3, a SWOT analysis of each variant was conducted. The presented strengths, weaknesses, opportunities and threats are a subjective assessment of the authors. Below is presented swot analysis of selected solutions (table 1-4).

3.1. Traditional building-plot structure

The traditional ownership structure is the most commonly used solution. However, this solution can cause serious problems in some cases. The most important elements of the analysis are presented in Table 1.

Table 1. SWOT analysis of variant 1 (description: E.Jasińska; P. Hanus)

<p>Strengths</p> <ul style="list-style-type: none"> • each building and plot constitute a separate property with a separate land and mortgage register; • ownership of each such property is consistent with the actual user of the building; • no problems with potential mortgage security; • independence from neighbors; 	<p>Weaknesses</p> <ul style="list-style-type: none"> • the need to obtain individual conditions for connections and underground utilities; • the need for individual access for each property to a public road; • restrictions in local plans related to the width and area of the plot
<p>Opportunities</p> <ul style="list-style-type: none"> • no need to agree/inform about the development of the area used; • independent repayment of any mortgage loan; 	<p>Threats</p> <ul style="list-style-type: none"> • limited possibility of shaping the structure of plots resulting from local plans; • possible difficulties in meeting a number of criteria resulting from local plans (e.g. development intensity or minimum area of a building plot)

3.2 Co-ownership structure

The co-ownership structure is also a frequently used solution. Also in this case, under certain conditions, the adopted ownership structure may involve threats. The most important elements of the analysis are presented in Table 2.

Table 2. SWOT analysis of variant 2 (description: E.Jasińska; P. Hanus)

<p>Strengths</p> <ul style="list-style-type: none"> • each building constitutes separate ownership of premises with a separate land and mortgage register; • no problems with potential mortgage security; • a project of access and connections for one cadastral plot; • investment costs related to the maintenance of buildings spread over the entire housing community; 	<p>Weaknesses</p> <ul style="list-style-type: none"> • joint ownership of land; • necessity to create a housing community and jointly make many decisions related to use; • necessity to agree on the method of division for use; • additional costs related to the management of the housing community;
<p>Opportunities</p>	<p>Threats</p>

<ul style="list-style-type: none"> • savings in construction costs; • smaller volume of construction documentation at each stage of investment implementation; 	<ul style="list-style-type: none"> • potential possibility of conflicts within the housing community; • necessity of managing the common property; • necessity of making decisions through voting by the housing community;
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3.3. Co-ownership structure with separate rights of use

The structure with separate rights to use is the most unusual solution. Despite several positive elements, it is associated with a number of risks. The most important elements of the analysis are presented in Table 3

Table 3. SWOT analysis of variant 3 (description: E.Jasińska; P. Hanus)

<p>Strengths</p> <ul style="list-style-type: none"> • possibility of separating any separate structures for use (including entire t-segments); • entrance and connection project for one cadastral plot; • investment costs related to building maintenance distributed among all co-owners; 	<p>Weaknesses</p> <ul style="list-style-type: none"> • joint ownership of land; • necessity of joint decision-making related to use; • necessity of agreeing on the method of division for use; • complicated mortgage security;
<p>Opportunities</p> <ul style="list-style-type: none"> • if necessary, the possibility of separating part of the segment for use; • relatively simple change of the structure of use; • the possibility of abolishing joint ownership and moving to variant 1; 	<p>Threats</p> <ul style="list-style-type: none"> • potential possibility of conflicts within co-ownership; • possible problems with changes in the structure resulting from the death of one of the co-owners;

3.4. Structure of the housing cooperative

The cooperative structure is a fairly popular solution, although it usually involves enrolling in a cooperative rather than having to create one. The most important elements of the analysis are presented in Table 4.

Table 4. SWOT analysis of variant 4 (description: E.Jasińska; P. Hanus)

<p>Strengths</p> <ul style="list-style-type: none"> • the buildings and land on which they are located are the property of the housing cooperative; • lower maintenance costs due to the fact that all members participate in covering the costs related to the maintenance of buildings and infrastructure; • lower maintenance and modernization/expansion costs of the property; • the right to elect the cooperative's board 	<p>Weaknesses</p> <ul style="list-style-type: none"> • the necessity of registering the cooperative and establishing its organizational structures; • the decisions are made by the cooperative board; • no ownership rights to real estate, only a cooperative right to real estate; • the necessity of providing legal services;
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<p>Opportunities</p> <ul style="list-style-type: none"> • possibility of reducing building maintenance costs, • more financially advantageous possibility of expanding buildings with common buildings and facilities, e.g. playgrounds, swimming pool, etc. 	<p>Threats</p> <ul style="list-style-type: none"> • dependence on the decisions of the cooperative's management board;
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4. DISCUSSION

Result of presented research and a review of the state of research revealed that the structure of private property ownership significantly affects the functioning of land and housing markets, and that the concentration of real estate wealth shapes the housing environment, especially when ownership of multiple properties is associated with concentrated control over residential land [5]. At the same time, an assessment of the impact of basic planning conditions for residential land, such as building density, on property values indicates that each factor analyzed affects property values, with the greatest impact being building density, was also the result of other studies [13]. The variants of proprietary solutions presented in this study are confirmed in other studies - the impact of social and economic factors on home ownership as an investment in American urban areas highlights the importance of economic factors in influencing the spatial layout of owner-occupied housing units [14]. Wilhelmson's research shows that the impact of housing construction has an impact on the value of single-family houses and its consequences for urban development, and it was found that multifamily housing projects did not affect the value of surrounding single-family houses, while the construction of single-family houses had a negative impact [15]. The research results presented in this article confirm that the land use change is an initial metric which enables to monitor urbanization processes, however, results on socioenvironmental systems can be more severe, therefore, sustainable urban policy should not only limit to defining rules of development but also controlling its implementation [Kazak et al. 2022]. Proper defining of land use changes and their dynamics can be helpful also not only in monitoring ongoing changes but also to predict future expansion of urban development on open areas, which is another important field of further studies [Kazak et al. 2015]

5. CONCLUSION

The analysis of the variant land ownership structure for single-family housing has important economic, urban planning, legal, regulatory, and environmental implications. Economic consequences are influenced by the concentration of property wealth, housing density, and social and economic factors that affect home ownership. Urban planning and development implications include the impact of housing construction on single-family home values and the redevelopment of land for densification. Legal and regulatory considerations include zoning, land use, and property management dynamics. The article proposes four alternative legal and neighbourly solutions enabling and promoting the construction of housing estates using highly intensive atrial development based on the T-haus. The study has practical implications for urban planners and policymakers. By carefully assessing development locations, policymakers can create a more sustainable, livable, and equitable urban environment that benefits all members of society. This research contributes to the field of housing economics by examining the impact of housing construction on single-family home values in the context of urban development and climate change mitigation. The presented solutions are limited by the legal and

ownership conditions of purchasing building land resulting from the Construction Law Act and the obligation to provide infrastructure access (including communication) to individual plots.

Future research should focus on how to evaluate the adopted solutions and calibrate the scale with respect to the social acceptability of residents. The application of legal solutions for a complex of T-type buildings presented in the article will in practice be conditioned by many factors. The main factor influencing the legal way of shaping the ownership structure will be:

- preferences of potential buyers of T-type buildings related to the way they are arranged on the building plot;
- conditions of the local plan of the commune, in particular regarding the minimum area of the building plot, minimum width of the plot, development intensity indicators, or minimum biologically active area;
- investment resources of the investor;
- investment resources of future buyers and the related target group of future buyers.

The above list can probably be extended, but it gives an idea of the relative nature of the described solutions. It is worth adding that solution 3, as the least typical, may also create problems with legal implementation, i.e. the need to find a notary with experience in creating this type of legal solutions.

The proposed solution will first need to gain social acceptance for the adopted architectural design and move beyond established design patterns. Legal solutions regarding the ownership structure of the land and the buildings on it depend on the size of the locality where the investment is planned and the preferred ownership structure in that area. It also partially depends on the economic situation of the investors. Further research in this area therefore requires a favorable social situation and an investor who, in seeking cost savings, will implement the additional variants proposed in the publication. An interesting solution, although not beneficial for everyone, may also be the establishment of a housing cooperative.

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