Verification of the Adaptability Level of Administrative Buildings in Bratislava

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Abstract

Bratislava's real estate sector, which encompasses both administrative and residential properties, faces significant challenges. A notable housing shortage characterizes the residential sector, while the administrative sector is experiencing a growing surplus of vacant office spaces. In the post-pandemic era, evolving workplace requirements and the global energy crisis have increased demand for high-quality buildings—a standard many older office buildings fail to meet. The initial part of this study provides an overview of the development of administrative buildings in Bratislava since the late 1990s. Empirical evidence from other cities and current trends suggest that converting office buildings into residential units is a viable solution. This research analyses the adaptability potential of Bratislava's administrative buildings for residential transformation. The study was conducted in two phases. In the first phase, a sample of twelve office buildings in Bratislava was analysed using the Conversion Meter (CM) method developed by Geraedts and Van der Voordt (2000), which we adapted to local legislation for research purposes. Based on the first three steps of the CM method—preliminary screening through NO-GO criteria, location assessment, and building condition analysis—eight buildings are in the category 'ideal for transformation' and four in the category 'transformable'. Further analysis compared results across the sample of buildings to identify common factors hindering the transformation process. These aspects were examined due to their potential to impact the intended transformation negatively. In the second phase, Research by Design, case studies were developed to analyse possible layouts of floor plans of various sizes regarding the dimensions of the structural systems of the given buildings. Additionally, the necessity of considering the local requirement for ensuring individual access to the exterior from each unit was addressed. Early identification of aspects against the adaptability of existing administrative buildings in Bratislava, presents an opportunity for both private and public sectors to proactively address these barriers, thereby facilitating transformations and supporting the current trend for sustainable urban development.

Keywords: *Architecture, adaptability, administrative buildings, conversion meter*

1. Introduction

Since the second half of the 1990s, numerous new administrative buildings have been constructed in Bratislava. This was due to several factors, especially well-developed infrastructure (highways, railways, a river cargo port, and proximity of the international airport in Schwechat, Vienna); a concentration of highly skilled labour and low wages [1]. With the arrival of companies such as Microsoft, IBM, Swiss Re, Accenture, and others, the demand for suitable office spaces increased. This opportunity created fertile ground for the development of developer groups whose business model was based on the construction and rental of administrative buildings through speculative development, that is, spaces designed and built so that their location, quality of execution, and level of technical equipment would suit the widest possible range of tenants, not necessarily considered for future transformation.

Under such conditions, office buildings began to be built in Bratislava, which shared many common characteristics. Often, they were built on the sites of former industrial enterprises which, due to the city's post-revolution development, became part of the broader centre. These were usually designed as monofunctional units/buildings with an administrative function and a share of services on the ground floor. Since rents were relatively low, achieving the required development value was largely dependent on the efficiency of construction economics and consequently, on the degree of floor space flexibility. Several local developer groups adopted this model, which gradually developed into strong competition in the local, relatively small, real estate market. This resulted in a faster moral depreciation of older buildings, significantly reducing their competitiveness, and thus their occupancy rate. In the last 30 years, up to 2.09 million m² of office space have been built in Bratislava [2]. Of this, 56% are in category A and 44% in category B. Only three of these buildings have the highest level of BREEAM or LEED certification [2]. With increasing demands on the level of energy ratings, sustainability, and workplace quality, a greater number of buildings will move from Category A to Category B and beyond. Based on experiences from real estate markets where such a situation has occurred in the past, for example, in the Netherlands in 2007, where it affected almost 5.9 million m² [3], we can assume that several office buildings in Bratislava will face increased competition to secure occupancy.

On the side of the residential sector, Bratislava has long faced a shortage of apartments, including social and rental housing. In terms of housing availability, it ranks among the worst capitals in the European Union [4]. For this reason, in 2021, the city announced a call for applications to amend the zoning plan to increase housing availability in the capital city of Bratislava. This city initiative focuses on the construction of new buildings to address the emerging crisis in the residential sector. Here lies an opportunity where the residential and office sectors can help each other, as the conversion of office buildings to residential buildings is a possible solution, especially in urban areas where the demand for housing is high [5] and can also help address the housing shortage in Bratislava. Generally, there are four possible ways to deal with long-unused buildings near the end of their life cycle: consolidation, renovation or modernization, demolition and new construction, and transformation [6]. Within this context, the use of multi-criteria models as a tool for building evaluation for potential adaptation represents a research area in the field of office building conversion. Following the evaluation of 5 models (TOBUS

Model, PAAM Model, iconCUR, ARP Model and model Conversion Meter) for our research Conversion Meter (CM) was chosen as the most appropriate tool, as it can be adapted to reflect local legislation and market conditions.

2. Research Methods

The purpose of the research is to examine the adaptability potential of existing administrative buildings in Bratislava, particularly in the context of a specific situation, that is, the surplus of unused administrative buildings in Bratislava that could be converted into housing.

The first phase of the research focuses on applying the selected CM methodology in the analysis of selected administrative buildings in Bratislava. The aim is to examine the suitability of this methodology for determining the degree of adaptability of administrative buildings, pointing to local specifics that would enable its more targeted use in the Bratislava context. The analysis according to the CM was carried out based on the adoption of this methodology as described by Geraedts et al. [3]. However, for a better application to specific local conditions, the relevance of each criterium of CM methodology was analysed. Irrelevant criteria were omitted and replaced with the following criteria which are based on Slovak technical standards [7]:

- The distance between the facades of buildings with windows of residential rooms must be at least 3 meters from the edge of the road; (added to the Quick assessment of Veto Criteria)
- Apartment buildings with three or more floors must be equipped with at least one elevator, with a minimum cabin size of 1100 mm x 1400 mm. (added to Step 2; Feasibility scan based on the building level; Technical Aspects)
- Every apartment in a residential building must have an outdoor space—a balcony, loggia, terrace, or front garden. (added to Step 2; Feasibility scan based on the building level; Technical Aspects)
- Barrier-free accessibility requirements must be met (added to Step 2; Feasibility scan based on the building level; Technical Aspects)

The CM methodology was applied to 12 selected budlings. All of them are located within the former industrial area, which has been transformed into a business district. Eleven of them are part of larger complexes and one is a single-standing building. Their total floor area (including other buildings within their complexes) represents 213 125m^2, which is 10.2% of the total office area of Bratislava. The summary is in the table 1 below:

Tab. 1. list of selected buildings

no.	name	author	location	opened
01	Apollo Business Centre 2 (A B)	Jančina Architekti	Prievozká ulica	2009
02	Green Point Offices blok F-G	Jančina Architekti	Prievozká ulica	2009
03	Green Point Offices blok H	Jančina Architekti	Prievozká ulica	2009
04	Bratislava Business Centre I	Ivan Kubík	Plynárenská ulica	1999
05	Bratislava Business Centre V	Ivan Kubík	Plynárenská ulica	2004
06	City Business Centre I	Aukett / CEPM	Karadžičová ulica	2007
07	City Business Centre III	Aukett / CEPM	Karadžičová ulica	2011
08	City Business Centre V	Aukett / CEPM	Karadžičová ulica	2011
09	Twin City A	CEPM/ Siebert+Talaš	Karadžičova ulica	2015
10	Twin City B	CEPM/ Siebert+Talaš	Mlynské nivy	2015
11	Twin City C	CEPM/ Siebert+Talaš	Mlynské nivy	2015
12	Forum Business Centre	CEPM	Prievozká ulica	2013

Fig. 1. location of selected buildings in Bratislava within a former industrial area

In the second phase of the research, using research by design method, individual case studies were prepared for each building. Within the case studies we were testing possible flat layout arrangements with a focus on fulfilling local requirements in particular daylight requirements, minimum size of the units requirements, barrier-free accessibility requirements, and access to outdoor space. In connection with the current preparation of new building legislation, the designed apartments were examined to see if they could also meet the requirements of adaptable housing [8,9].

3. Research findings

The assessed buildings were constructed in a location that had long been considered a brownfield site in Bratislava, however, in recent decades this area became part of the broader city centre. For this reason, from a development perspective, the area had strong potential. A major advantage is its easy ~~p~~edestrian access with ideal proximity to the city centre. This area is also well-connected to infrastructure and public transportation. Additionally, as these were administrative buildings with a specified number of required parking spaces during the permitting stage, they have sufficient parking capacity. Given their location in the broader city centre, they also benefit from excellent access to civic amenities and services.

The result of CM showed that from 12 tested buildings 8 were classified as 'ideal for transformation' and 4 as 'transformable'.

Tab. 2. CM evaluation results

no.	name	status
	Apollo Business Centre block 2	
01	A B	transformable
02	Green Point Offices block F-G	transformable
03	Green Point Offices block H	ideal for transformation
04	Bratislava Business Centre I	transformable
05	Bratislava Business Centre V	ideal for transformation
06	City Business Centre I	ideal for transformation
07	City Business Centre III	ideal for transformation
08	City Business Centre V	ideal for transformation
09	Twin City A	ideal for transformation
10	Twin City B	ideal for transformation
11	Twin City C	ideal for transformation
12	Forum Business Centre	transformable

Within the feasibility check using the CM method on location level, eight aspects categories were marked with YES answers and on building level four. For clarification, the results are summarised in table 5 below:

Tab. 3. Evaluation of the analysed aspects (according to the modified CM method)

Building		1	2	3	4	5	6	7	8	9	10	11	12
aspekt	**nu.**	**appraisel yes**	**appraisel yes**	**appraisel yes**	**appraisel yes**	**appraisel yes**	**appraisel yes**	**appraisel yes**	**appraisel yes**	**appraisel yes**	**appraisel yes**	**appraisel yes**	**appraisel yes**
functional													
building gets little or no sun	2	☑	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐
buildings on > 75% of the floor area	3	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
distance to railway station > 2 km.	11	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
many obstacles, traffic, congestion	13	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐	☐	☑
cultural													
situeted near edge of town	16	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑
dull enviroment	18	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☑
Noise or odor pollution	21	☑	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☑
legal													
noise load on facade > 50dB	22	☑	☑	☐	☑	☐	☑	☑	☑	☑	☐	☑	☑
functional													
some office space still in use	3	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☐
target groups cannot be implemented.	6	☐	☑	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐
technical													
Module of support structure < 10 m	12	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Impossible to install (sufficient) service ducts	18	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐

3.1 Evaluation at the Location Level

When assessing the functional aspects, we found that the buildings had only one common disadvantage: a greater distance from the train station. However, the main bus station is within walking distance of all the buildings. The city also plans to extend the tram line to the area. A serious common risk in this category is compliance with daylight and glare standards. The assessed buildings often either had

unfavourable orientation (with large portions of the façade facing north or caused self-shading (in cases of atriums or recessed lower floors). In such cases, lighting studies will be necessary to evaluate the suitability of the proposed function. While a preliminary evaluation can be done through an inspection, a final assessment of new layouts will be needed to determine the feasibility of the transformation.

In the category of cultural aspects, noise-related risks were identified in nine out of 12 cases. This is because the areas where the assessed buildings are located are bordered by major traffic arteries. This factor must be considered when designing a new design with regard to the intended function but also the target user group in mind.

In the category of legal aspects at the locality level, a frequently identified issue was noise pollution on building facades generated by traffic. Since transportation was also the source of noise in the previous category, an acoustic study will be required for each building to analyse and evaluate this issue. If noise limit exceedances are confirmed for the assessed buildings, acoustic measures will need to be proposed to mitigate the negative impact. There are technical solutions available to improve this condition; however, their implementation would have financial implications for the economic feasibility of the transformation.

3.2 Evaluation at the Building Level

In the category of functional aspects, occupancy was negatively evaluated in all cases, as all buildings are currently at least partially occupied with their original function of administrative premises. It is worth noting that all assessed buildings (or parts of them) are being actively offered for lease. This reflects the state of the real estate market, where supply exceeds demand.

In all cases, the expandability of the buildings was evaluated as unfavourable for transformation. This is mainly due to their original speculative development design, which exhausted available regulations capacities. In many cases, upper floors were set back from the façade precisely to prevent excessive shading of neighbouring buildings. The remaining available footprint of the top floors is insufficient to accommodate additional extensions. Regarding underground floors, all assessed buildings currently have basements. In cases where the buildings are part of a larger complex, the basement is shared among multiple buildings.

In the category of technical aspects, a module depth of less than 10 meters was a recurring factor against transformation. This dimension limits the ability to create floor plans that allow for optimal use of space. If the depth is insufficient, reconstruction efforts must account for columns that may be positioned within the new flat floor plan, potentially resulting in compromised layouts that could negatively impact sales value. For example, in building Central Business Centre I, the internal distance between the perimeter column and the structural core in the tower section is less than 5 meters, significantly limiting the feasibility of new apartment layouts. In the case of double-module width layouts, the depth of units that do not include columns is further reduced by the width of the hallway.

A final negative technical factor was the limited ability (or inability) to install additional service infrastructure. Creating new openings within structural floor slabs requires individual structural assessment, which is only possible after a new design has been developed. The feasibility of vertical penetrations depends on their size, location, and number. Newer buildings often include “wet columns, " which feature pre-designed penetration points near structural columns, allowing for flexible plumbing installation. This design element greatly facilitates transformation. However, vertical circulation elements (staircases, elevators) may still require larger penetrations. Such modifications are technically feasible but complex and costly, and their viability must be backed by detailed design studies considering both layout and technical feasibility. Decisions on their implementation will be made in later phases of the transformation process. Nevertheless, based on currently available information, we can conclude that all buildings have strong potential for transformation.

For the closure of the building evaluation, it is necessary to provide several notes on specific situations that are not visible from the CM evaluation. Even though all buildings have met the first step in terms of compliance with the zoning plan, we must emphasise that this status may only be temporary. For example, in the Apollo Business Centre II project, all buildings of the complex are located in zones with code 201-urban amenities. The residential function is permitted in this zone but only to a limited extent—up to 30% of the total above-ground floor area of the functional area. In the given functional area, in addition to the Apollo Business Centrum II buildings, in 2021 there was built a new residential building which brought residential function to the functional zone. The total floor area according to the building permit documentation, is 12,780 m². The remaining capacity for residential use is 10,980 m². The Apollo Business Centrum II Block F-G building has a total area of 16,500 m². This would allow only for partial transformation into a residential function. In this case, the lower floors are recessed, making them shaded by the upper floors. Considering their orientation to cardinal directions and the surrounding development, a residential function is not suitable for these floors. Therefore, these lower floors can retain their administrative function, and only the upper floors (3rd-7th floors) will undergo a functional change. However, in this scenario, the entire residential capacity is exhausted, making it unavailable for the rest of the buildings in the complex. The only remaining solution is a change to the zoning plan, which presents a significant risk in terms of transformation timeline planning and thus needs to be addressed in advance.

3.3 Case Studies

In the second phase, the proposed layouts of apartments in the spaces of the 12 office buildings studied were analysed using the 'research by design' method. The aim was to place units of different sizes (single room, double room, and larger) in different structural modules (which were used on the selected buildings). The most common structural modules were 8.1m x 8.1m (applied 4 times) and 7.8m x 7.8m (applied 3 times). The layouts tested reflect the demand in the local market and are also in line with local requirements for residential buildings

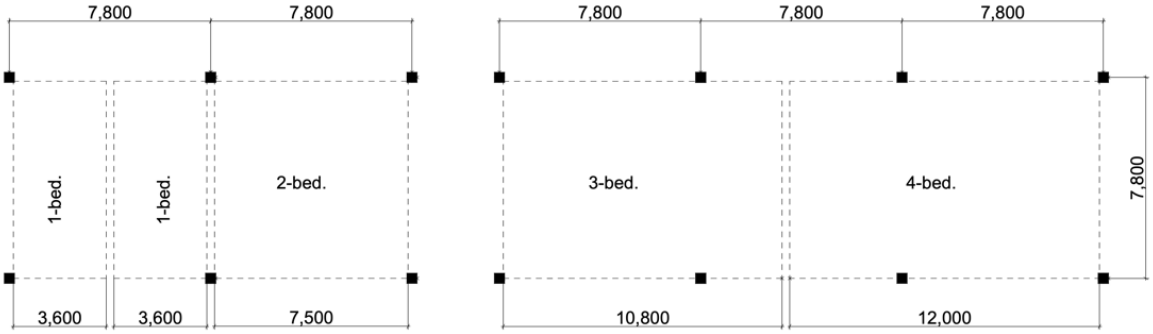

Fig. 2. flat layout arrangement for module 7.8 m x 7.8 m

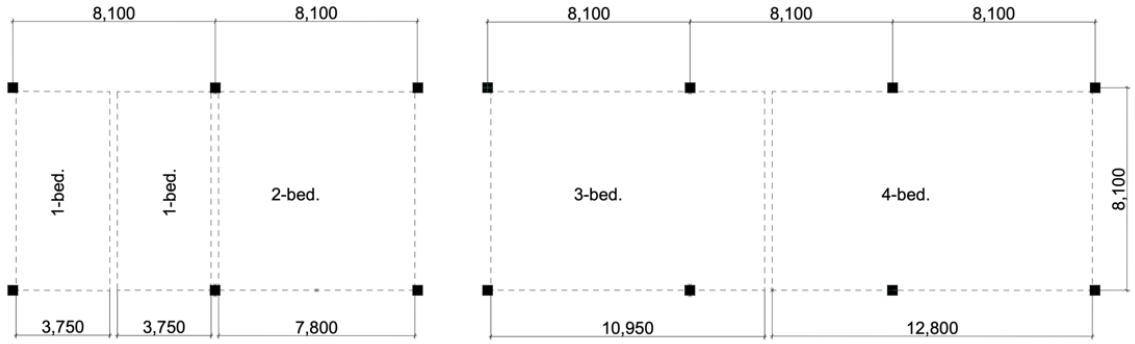

Fig. 3. flat layout arrangement for module 8.1m x 8.1m

The proposed flat layout also reflects the requirements (currently in preparation) for adaptable housing (minimum corridor width, minimum sizes of bathrooms, door width, etc.). Within the study, the accommodation of the requirement for individual access to the exterior was tested with two scenarios: by adding a balcony or loggia. Both options are feasible within the given modules; however, the application of either would need to be re-evaluated from a cost perspective during project preparation. In the case of loggias, they occupy a portion of the internal floor area, which, in certain circumstances (small units within smaller modules), cannot be implemented. In such instances, the application of a balcony is the preferable option. It is important to mention that our research shows nine buildings with a similar solution for perimeter beams. The load-bearing structural element is designed as an upstand beam hidden within the windowsill. As such, it cannot be penetrated to allow for access to the balcony, leaving the loggia as the preferable solution. This study concludes that both options are viable, but the decision on their application needs to be made on an individual basis during the preparation of the financial feasibility. For reference, the possible flat layouts of the two smallest units on the background of the two most commonly used structural grid systems) are demonstrated below.

Fig. 4. loggia and balcony layout option of 1-bed. and 2-bed. units within the module 7.8m x 7.8m

Fig. 5. loggia and balcony layout option of 1-bed. and 2-bed. units within the module 8.1m x 8.1m

4. Conclusion

It is evident that Bratislava faces a potential surplus of office spaces, which are struggling with insufficient tenant demand, while at the same time experiencing a shortage of residential units (both in private ownership and rental housing). This observation forms the foundation of the research objectives. First, it is to identify the adaptability level of office buildings in Bratislava and second is to demonstrate possible floor layouts which could be achieved whilst meeting all requirements. As such, the research enables the early identification of aspects that may hinder the process of transformation. This is particularly relevant given that Bratislava's urban development since the late 1990s has led to public apathy and even resistance toward any new development. As a result, developers have a poor reputation, citizens distrust the approval process, and meaningful discussions on urban development are lacking [10]. Since the city has also identified improving communication with the private sector as one of the essential steps in its strategic documentation on housing policy, the use of an appropriate methodology for assessing the transformation potential of buildings (both from the city's perspective and from the investor's side) can

significantly aid the entire process. Based on our research, the Conversion Meter methodology appears to be a suitable tool for general application in verifying the adaptability of administrative buildings in Bratislava.

In addition, our research also aimed, through the case studies, to highlight design solutions that can facilitate the transformation of selected buildings. And as such, to support Bratislava's future urban development with the principles of the circular economy and sustainable development.

References

1. National Bank of Slovakia, "Foreign Direct Investments in Slovakia in the Years 1995-1999", Bratislava: National Bank of Slovakia, 2021 [Internet]. Available from: https://nbs.sk/_img/documents/publik/1999_priame%20zahranicne%20investicie%20na%20slovensku.pdf.
2. Cushman & Wakefield, "Bratislava Research Forum Announces Office Market Figures for Q4 2023" 2023 [Internet]. Available from: https://www.cushmanwakefield.com/en/slovakia/news/2024/01/bratislava-research-forum-announces-office-market-figures-for-q4-2023.
3. R.P. Geraedts, T.J.M. Van der Voordt, "A Tool to Measure Opportunities and Risks of Converting Empty Offices into Dwellings", Proceedings of the EHNR Rotterdam International Conference on Sustainable Urban Areas, 2007.
4. Hlavné mesto Slovenskej republiky Bratislava, "Concept of Urban Housing Policy 2020-2030" (Concept of Urban Housing Policy 2020-2030), Bratislava: Hlavné mesto Slovenskej republiky Bratislava, 2021 [Internet]. Available from: https://mib.sk/wp-content/uploads/2021/03/Koncepcia-bytovej-politiky_2021.pdf.
5. M. Zivkovic, M. Tanic, S. Kondic, V. Nikolic, N. Vatin, V. Murgul, "The Sustainable Strategy of Obsolete Building Conversion", Applied Mechanics and Materials, 725-726:1199-1205, 2015.
6. H. Remoy, T.J.M. Van der Voordt, "Adaptive Reuse of Office Buildings: Opportunities and Risks of Conversion into Housing", Building Research and Information, 42(3): 381-390, 2014.
7. STN 73 4301 (Slovak Technical Standard), Dwelling buildings, 2021.
8. EN 17210:2021, "Accessibility and Usability of the Built Environment - Functional Requirements", 2021.
9. TR 17621:2021, "Accessibility and Usability of the Built Environment - Technical Performance Criteria and Specifications", 2021.
10. Bratislava.sk, Methodology for Changes to the Spatial Plan of Cities in the Interest of Building Prerequisites for the Development of Rental Housing and Increasing the Availability of Housing (Methodology for changes, Bratislava: Hlavné mesto Slovenskej republiky Bratislava [Internet]. Available from: https://cdn-api.bratislava.sk/strapi-homepage/upload/Metodika_06_2023_Najomne_byvanie_0dda1f446b.pdf, 2021.