
How pandemic and sustainability concerns transform the office market - a case study of Budapest, Hungary



Abstract

Major forces are transforming the office real estate market globally. One such force is the COVID-19 pandemic, which triggered a substantial growth in remote work. Another can be found in environmental concerns that demand sustainable buildings and operations. A third is the increasing emphasis on the health and safety concerns regarding buildings. A fourth is the changing economic/geopolitical landscape. The purpose of this paper is to evaluate the relationship between the increasing emphasis on remote work (partially as a result of COVID-19), environmental sustainability for buildings and office space, and larger financial concerns and the types and sizes of leasing and purchasing transactions for green-certified and non-green-certified spaces in Budapest before, during, and after the global pandemic. The goal of the research is to map the office tenants' size optimization attitudes since the global pandemic outburst. The research aimed to understand how the Budapest office market reacted to the global pandemic, with particular emphasis on green-certified office space. The research examined Budapest office market leasing transactions between 2018 and 2022 by way of a statistical analysis and individual interviews with market actors. Results show that after a small decrease in 2020, the average, green-certified transaction size increased in 2021; however, it showed a 13% decrease in 2022. In the case of not green-certified offices, the average transaction size decreased for 2 years, but in 2022, increased by 60%. Market actors see a large demand from multinational companies for green offices, as environmental, social, and governance (ESG) policies drive corporations; however, there are financial pressures at play, which motivate tenants to optimize their space decisions.

Keywords: Budapest office market, green-certified offices, real estate, lease sizes, COVID-19, ESG

JEL code: R11, R33

INTRODUCTION

The global coronavirus (COVID-19) pandemic strained public health resources throughout the world and disrupted the global economy. The public's interest in living in high-density cities drastically decreased as a result of COVID-19, which has also changed working and residential location preferences (Wen et al., 2022). Ramani and Bloom (2021) discovered that suburbs saw a net gain of 2%, while the central business districts (CBDs) of the top 12 U.S. cities experienced a net drop of 15% in population and business presence. Additionally, Barrero, Bloom, and Davis (2020) estimated that work-from-home activity will continue to account for 20% of total working hours – four

times the pre-pandemic level in the Western world. Gupta, Mittal, and van Nieuwerburgh (2022) discovered that the transition to remote work led to a 28% drop in the long-term value of office buildings in New York City. Gujral et al. (2020) established that this change will disrupt the CBD economic environment and reduce consumer spending in major cities' CBDs by about 5 to 10%. Several other studies stated that COVID-19's effects on firm closures, workplace norms, and consumer behaviour will result in less demand for commercial real estate (Ling et al., 2020; Maria del Rio-Chanona et al., 2020; Oladiran et al., 2023). In its global survey of 'superstar' cities, McKinsey Global Institute reports that demand for office space has been falling since the start of the pandemic and predicts that demand will continue to fall over the next seven years in most of the cities surveyed. The increasing number of remote workers correlated with the degree to which office attendance fell, showing that the two phenomena were related. Lower office attendance has similarly driven down asking rents in real terms as well. McKinsey predicts demand for office space in a moderate scenario will be 13% lower in 2030 than it was in 2019 for the median superstar city as a result of remote work and flexible working arrangements and as the amount of space allocated to each office worker is expected to shrink (Mischke et al., 2023).

Before the global pandemic, offices were widely believed to be important for employee productivity and business culture and a powerful winning tool for the struggle for talent. Businesses worldwide engaged in fierce competition for the best office space, and many of them concentrated on ideas that were thought to encourage teamwork. The recurring themes and objectives were densification, green certification, open-office layouts, hot-desking and co-working. Company managers, real estate agents and consultants, and also office workers themselves were shocked by how fast and efficiently videoconferencing technology and other digital collaboration tools have been adopted throughout the global pandemic. In the emerging world of remote work, many companies believe they can access fresh talent pools with fewer geographic restrictions, adopt cutting-edge techniques to increase productivity, forge a stronger culture, and drastically lower real estate expenditures all while relying less on the conventional office space and office culture (Umishio et al., 2022).

The purpose of this research is to evaluate the relationship among the increasing emphasis on remote work (largely fuelled by COVID-19), environmental sustainability for buildings and office space, and larger financial concerns and the types and sizes of leasing and purchasing transactions for green-certified and non-green-certified spaces in Budapest. The research does this by way of a detailed statistical analysis of office leasing deals and green certifications between 2018 and 2022 in Budapest, augmented by individual interviews with real estate market actors, including three property managers, five leasing agents and eight tenant representatives. The goal of the research is to map the office tenants' size optimization attitudes since the global pandemic outburst.

The main hypotheses were that since the appearance of the pandemic, office tenants prefer to lease smaller sizes of office building space and are hesitant to upgrade to larger spaces, with this effect being more moderate in green-certified buildings and more pronounced in the conventional (non-green-certified) office space market.

The paper is structured as follows: First is an international literature review of the COVID-19 and green certification office topic. This is followed by detailed research and analyses including the results of the survey and investigation conducted in Budapest. Finally, suggestions are made for further research such as country comparison or the repetition of the research after a few years.

1. LITERATURE REVIEW

The performance of the office space rental markets has received much examination in the literature over the past few decades. From the viewpoint of the occupier market, rent and vacancy rates are the major variables dictating the amount of cashflows received by owners and stakeholders of office real estate. The value of a real estate asset also directly links to the effective rental level and the vacancy level of nearby properties. Numerous theoretical and empirical studies have shown the close relationship between these two indicators: high vacancy fosters a “tenant market” that results in weaker (negative) rent growth, while low vacancy fosters a “landlord market” that results in stronger rent growth (Glascocock et al., 1993; Hendershott et al., 1999; McDonald, 2000; Wheaton–Torto, 1988). Therefore, the same supply and demand factors affect both rent increase and vacancy rate. The latter (demand factors) include structural characteristics such as office space per employee (Miller, 2014), GDP growth (D’Arcy et al., 1997; Gardiner–Henneberry, 1989), employment in (office) settings (Hendershott et al., 1999; Sivitanides, 1997), and employment in general. An inverse relationship between the economies of office markets and working from home should be identifiable through an analysis of employment variables. The long-term impact on the total demand for office space and the performance of office markets continues to draw special attention from practitioners in light of the possibility of a higher level of homeworking in the future (Morawski, 2022).

Changes in the everyday routines of millions of office workers worldwide were one of the most obvious effects of the COVID-19 pandemic. No comparable episode in modern history has changed working arrangements as profoundly and quickly as has COVID-19. The shift from farms and craft production to factory jobs during the Industrial Revolution took about two centuries and the later shift from factory work and other goods production to a service economy has been an ongoing process for decades (Aksoy et al., 2022). The global working-from-home experiment during the pandemic has been relatively successful, and this has sparked concerns about a potential structural change in the office space and rental sector. The long-term effectiveness of working from home versus working at an office is still largely disputed, but if the homeworking trend persists, it may result in a considerable decline in the demand for office space, which would have the effect of increasing vacancy rates of office space, obsolescence of some office spaces, and dropping rents. Some forecasts, particularly the early ones, suggest that offices will be used less, leading to a depression in office space sector prices (Morawski, 2022; Nixey, 2020). Other researchers draw attention to the fact that face-to-face communication is still necessary also preferable and is most effective when it occurs in offices. Therefore, even if some work was done from home, it would only affect

the nature of the office space utilized by businesses rather than significantly damage it (Kröger, 2021; Schede, 2021).

Any analysis of the post-pandemic recovery process must take into account the global labour market disruptions that have led to numerous experiments with remote work, flexible work schedules, and novel connections to centralized work settings. However, when it comes to the long-term predictions, there is disagreement over whether the coronavirus disease was a singular event and that pre-pandemic working norms will return, or whether the world is going through a massive upheaval that will usher in a 'new normal' for working conditions, with researchers and governments speculating about a wide range of different 'new normal' future states of the world (Vyas, 2022).

The implementation of telework, upcoming workplace design and configuration changes to work norms and the office environment, and re-engineering of office work protocols have all been prompted or accelerated by COVID-19. Analyses of management techniques show the trade-offs made between financial rewards and workplace health and safety. Advancements in technology will make office management strategies and justifications for those strategies more easily assessable and will make those who implement them more readily answerable to office personnel and other stakeholders in a way that was impossible in the earlier era of official accountability reports (Parker, 2020). The pandemic had a catalytic role in the shift to remote work, as the pandemic induced a mass social experiment out of necessity. That experiment generated new information about working from home and it changed the perceptions of its effectiveness. The new information and the shift in perceptions led to individuals and organizations re-optimizing space use, which has proven to have a lasting effect even after the pandemic situation ceased (Aksoy et al., 2022).

Local circumstances have a significant impact on workplace strategy. Before the COVID-19 epidemic, on average, between 35% and 45% of workers in the USA and EU-28 worked occasionally or regularly from home or a public place (such as libraries or cafés), but the number of persons who did so varied greatly by nation (Tagliaro–Migliore, 2022). Italy and Portugal had low adoption rates (25%) compared to the Nordic countries in Europe (all above 50%) (OECD, 2020). The amount of working from home varies across countries and regions. The highest levels are in the Nordics – both in America and Europe. Lower levels characterise Southern Europe, and even lower Asia and developing countries, as the share of remote work highly depends on the share of employment in remote-friendly industries like technology or business services. There are a variety of explanations for this variation across countries and regions. North American homes tend to be larger and thus accommodating a home workspace is easier, whereas in Europe and particularly in Asia houses and apartments are often smaller (Barrero et al., 2020).

The state of industrialisation of a nation or region also influences this transformation. Those economies that are more oriented towards technology, finance, and business services are better suited to embrace remote work. In the United States, compared to other parts of the world, companies have more refined performance measurement and evaluation systems that make introducing and maintaining working from home

easier. The quality and availability of high-speed internet connections and the size and adaptability of residential accommodation have a considerable impact on working from home. Within countries, variations exist among regions as remote work is far more prevalent in urban and suburban communities than in rural areas, as urban and suburban economies are more reliant on technology and business services than on farming and industrial production (Aksoy et al., 2022).

Cross-country comparison of the Global Survey of Working Arrangements (G-SWA) data covering 27 countries proves that longer, stricter government lockdowns during the pandemic led to higher work-from-home levels as of mid-2021 and early 2022 and also to higher planned remote work levels after the pandemic. The social acceptance of remote work has risen in all countries since the pandemic, corporate cultures have embraced the concept, and managers are more willing to offer flexible conditions to retain and recruit employees. This improvement in social acceptance also contributes to the lasting effect of the pandemic (Aksoy et al., 2022). Only a minority of office employees would return to the corporate office full-time if given the choice, according to recent polls (Tagliaro–Migliore, 2022), while the majority are now willing to switch between the office, their homes, and other work sites. According to several studies, working from home is superior to working in an office in every way (Amoils, 2021; Gashi et al., 2022; Prodanova–Kocarev, 2022).

Collectively, these findings have compelled businesses to take unconventional real estate positions. Three primary work policies have served as the foundation for the most recent corporate real estate (CRE) strategies:

- the traditional, work from the office all the time method;
- work-from-home (WFH) all-the-time/remote work all-the-time method;
- *smart working* (hybrid working).

Changing work policies have also driven attention to the topic of *greenness*. Before the pandemic, sustainability was on the global radar, but Covid-19 has pushed it to the centre of the screen, making it a priority when evaluating every aspect of work that touches upon the environment, including offices, enterprises, and commutes. Investors, customers, and employees are increasingly demanding that businesses have a positive impact on the environment and society. There is growing evidence of enhanced revenue and profit growth, greater returns on equity and assets, and lower cost of capital as a result of greening the business model of how companies operate (Brounen et al., 2021; Gholami et al., 2022). The costs of sustainable practices implemented are direct and easily measurable; however, their impact on financial performance and asset value is more challenging to calculate as their value improvements are indirect and intangible. The key value drivers as defined by the United Kingdom Green Building Council (UKGBC) are factors that can be influenced, measured, managed, and controlled and as a result, affect the value of the business by reducing risks, increasing profitability, and increasing future probability. UKGBC has identified and ranked the most common drivers of value for businesses whose primary business is related to the built environment (such as real estate developers, construction-related businesses, property portfo-

lio managers). The 11 value drivers were: cost saving, talent attraction and retention, customer attraction and satisfaction, brand and reputation, licence to operate, resilience, access to capital, innovation, productivity, quality, and value of assets (UK Green Building Council, 2018). There are three categories of value drivers: growth drivers, efficiency drivers, and financial drivers (L. E. K Consulting, 2017). Green certification and sustainability reporting also foster monitoring of the operational efficiency of assets. Survey evidence proves that for the majority of large firms, it has become the norm to track sustainability data as this is required by eco-certifications and green reporting structures as well as by internal environmental, social, and governance (ESG) policies (Christensen et al., 2022).

As the built environment industry^[1] is highly competitive, cost saving is a high priority. Sustainable business practices and cost savings are no longer viewed as separate or contradicting realities. On the contrary, embedded sustainability efforts result in a positive impact on business performance. Significant cost savings are to be realized through increases in environmental sustainability-related operational efficiency (Whelan–Fink, 2016). Resource-efficient companies that use less energy, resources, and materials and as a result produce less waste, tend to produce higher investment returns compared to their resource-intensive peers (Heyns, 2012). “The real estate sector consumes over 40% of global energy annually, while 20% of total global greenhouse gas emissions originate from buildings.” (World Economic Forum, 2015, 6) After water, concrete is the most used material in the whole world. Furthermore, construction is responsible for 40% of raw material use globally and by 2030 buildings are expected to use 12% of global freshwater resources while generating 30% of total waste in the European Union (World Economic Forum, 2016).

Market value is the most commonly used value when comparing building assets. It is the estimated price at which a building can be sold on the marketplace to a willing buyer by a willing seller under normal market conditions, meaning that both transacting parties have reasonable time to research and evaluate the market and act knowledgeably. For income-producing properties, the market value directly links to the amount of rent tenants are willing to pay in exchange for the use of the building. The rental value strongly correlates with the location, prestige, technical quality of the building, and the lease terms and the operating expenses of the building. Studies conducted in the United States and Australia revealed that Energy Star, LEED, and Green Star-rated buildings command rental premiums of up to 17.3%. (World Green Building Council, 2013). Further evidence shows that the LEED brand communicates clear premiums to the market, while access to public transit, access to natural light, water conservation

[1] Based on the EPA’s definition, the built environment „touches all aspects of our lives, encompassing the buildings we live in, the distribution systems that provide us with water and electricity, and the roads, bridges, and transportation systems we use to get from place to place. It can generally be described as the man-made or modified structures that provide people with living, working, and recreational spaces”. The built environment industry includes all the professional fields that deal with the built environment. Source: <https://www.epa.gov/smm/basic-information-about-built-environment>

measures, premium HVAC systems, electric car charging stations, and walking access to services all provide value enhancements beyond a LEED certification. Other green measures like recycling facilities, measures to improve indoor air quality, showers on-site, fitness facilities, and energy-efficient electric systems may also provide value in some situations, likely dependent on other green variables in the mix in a particular market or building (Lee et al., 2017; S. Robinson et al., 2017; S. J. Robinson–Simons, 2018). Hereby it is important to highlight the notable significance of health and well-being features in the buildings when it comes to green solutions. As Allen et. al claims, green buildings, by definition, concentrate on reducing their negative environmental effects by using less water and energy, as well as causing as little disruptions to the surrounding environment as possible during the construction process. By definition, green buildings also seek to enhance human health by creating healthy indoor settings, albeit this goal may not be as well known (Allen et al., 2015). This means that green building features can improve mental well-being and reduce stress levels that can increase the occupant satisfaction and comfort. A great feature that can help to reach these goals is the on-site fitness or gym facility or even the bio food canteens and restaurants in the office buildings that serve healthy, vegetarian, fair trade and bio meal options for the occupants.

As commercial property is a multifaceted business – encompassing everything from investment strategies to building operations – and since the involved stakeholders have different interests and concerns, there are different perceptions of ESG and its value. Thus, determining the true performance and quality of a sustainable real estate business remains a challenge. One way to meet this challenge is to seek green certification of real estate properties and portfolios. (Vieira de Castro et al., 2020). Our research seeks to provide empirical evidence in workspace strategies regarding office space optimization and green ambitions of tenants in light of office leasing performance during and after the COVID-19 pandemic period.

2. RESEARCH METHODOLOGY

Research for this paper began in 2023 and included an analysis of office market data from Budapest between 2018 and 2022, the results of which were further augmented by individual interviews with office market actors. The basic aim of the research was to understand how the Hungarian office market was changed by the COVID-19 global pandemic. The main goal of the study was to find out if there was any measurable space optimization or lease size change trend observable due to the global pandemic in the Budapest office market. Did green-certified buildings see increases in space occupancy rates or lease transaction sizes compared to general office assets as a result of the pandemic?

Statistical analyses for this research project included office market leasing data from the past five years (from 2018 to 2022), which was collected from office market actors, such as real estate agents, landlords, tenants, and the Budapest Research Forum (BRF). The database included 2,826 office leasing transactions from 2018 to 2022, all of which were signed for modern office building space (Class ‘A’ and Class ‘B’) in Budapest, Hungary. As more than 90% of the total modern office stock of Hungary is located in

Budapest, an examination of the city's office market trends can show the country's office market situation. The database also included the name of the buildings, green certifications of the buildings (if there were any), the size of the leased office area in square metres (m²), and the tenant sector as follows (Table 1).

Table 1 Structure of the database

Year	Building	Green certification	Tenant sector	Type of deal	Size of deal
The year when the lease agreement was signed (2018–2022)	Name of the office building	Does the office building have a green certification?	The business sector of the tenant (i.e., banking, consultancy, etc.)	Renewal, New, Pre-lease, Expansion, Sub-lease, Owner Occupation	Size of the leased office area in m ²

Source: Authors' research tool (database)

Table 2 shows the deal type definitions.

Table 2 Definition of different deal types

Renewal	The existing tenant renews its lease agreement in the same office space in the same building
New	A new tenant enters the office market or an existing tenant moves into a different office
Pre-lease	Tenant signs a lease agreement in a building which is under construction at the moment of signing the leasing contract
Expansion	The existing tenant expands its office space in the building
Sub-lease^[2]	An existing tenant gives some of its office area permanently to a business partner/different tenant
Owner Occupation	A company moves into its own Headquarter building

Source: Authors' research tool (database)

Statistical analysis is the process of collecting and examining data to find patterns and trends. It is a technique that makes use of numerical analysis to remove bias from the evaluation of data. The procedures of data analytics and data analysis entail drawing conclusions from data so that decisions can be made with confidence. Additionally, statistical analysis techniques are useful for constructing statistical models, designing surveys, and accumulating research interpretations. In this study, the authors used descriptive statistics, a fundamental statistical technique that uses indices like mean and median to summarize data, within the scope of data analysis.

After the data collection and analysis, individual interviews were made with several

[2] Sub-lease agreements entered the Budapest office market as a result of the global pandemic. As most of the office lease agreements do not allow sub-lease contracts, this phenomenon is very rare in the Hungarian office market.

market actors (including three property managers, five leasing agents and eight tenant representatives), based on the results of the database. The main topics of the discussions were remote work, ESG and green strategies, and the future of office spaces. Our main questions were about their experience and opinion about green preferences on the Budapest office market, and also their potential green and sustainability strategy, including their everyday work and operation. We conducted the interviews within the framework of a personal meeting with the respondents. We made semi-structured interviews with our participants as few questions were predetermined, but other questions weren't planned, and we let the respondents sometimes freely flow in the topics to gain a deeper clarification and insight into their opinions and point of views. Generally, we prepared 6-8 questions for each interviews such as the following:

- What is the role of greenness and sustainability in the Budapest office market?
- What experience do you have with ESG frameworks in the Budapest office market?
- At your company, do you have a green/sustainability/ESG strategy? Do your clients usually have a green/sustainability/ESG strategy?
- Is there a remote work/telework/home office possibility at your company/at your clients' company? If yes, what are your experiences about it?
- What is your opinion about the COVID-effect on the office market? Do you experience any on the longer term?
- Do you think COVID-19 has been changing the office leasing trends, regarding lease terms, rent levels or leased space sizes?
- Based on your experience, what are the most important factors or features of a green-certified office?

The available academic literature mainly focuses on the trends of remote working and general office market sentiment trends related to the global pandemic, and less on analysis of lease size structure and changes from the past few years. Therefore, this paper is unique in that it addresses office leasing size trends related to the global pandemic. Taking into account the current office market trends and discussions with different market actors, the research addresses the validity of the following hypotheses (Table 3).

Table 3 Main hypotheses of the research

Hypothesis 1	As a result of remote working becoming widely used in the global business world in the past 3 years, companies started to lease smaller office areas
Hypothesis 2	The reduction in lease sizes differed by tenant type, depending on the business sector in which a company operates.
Hypothesis 3	There was no significant deal size change (meaning overall value or m ² of space leased) in the case of green-certified office buildings as a result of the pandemic due to their consistent popularity with tenants.

Source: Authors' research

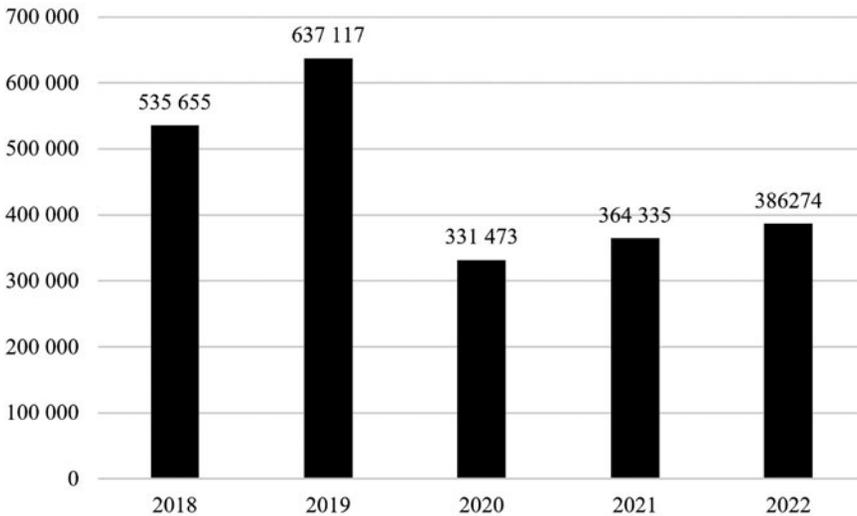
3. RESULTS

Based on the statistical data analysis, results show that the leasing activity significantly declined in the Budapest office market in 2020, when the COVID-19 global pandemic hit the economy. Figure 1 shows the annual volume of signed leases represented in square metres.

In 2019, the Budapest office market reached its all-time peak, with a total annual leasing activity of 637,117 m² of leased space. After this record volume of transactions, the leasing activity in the Budapest office market declined by 48% in 2020, when the global pandemic depressed office markets worldwide. Although the volume of space rented started to increase again in 2021, at the end of 2022 it was still 40% lower than in 2019, at an annual level of 386,274 m² leased space during 2022.

Table 3 represents the volume of the different office lease types between 2018 and 2022 in square metres. As can be seen from the data, although the volume of renewals dropped in 2020 compared to 2019, it never dropped significantly below 2018 levels, with 2019 appearing as a market outlier. This shows that tenants have remained reasonably confident in the market and renewed their leasing contracts at a rate that matches recent historical norms. On the other hand, Figure 2 indicates that the volume of new leases (new market entrants or existing tenants moving into new locations) significantly declined since COVID-19, suggesting a decreased willingness of market players to take risks in the form of relocations or new leases.

Figure 1 Total leasing activity (m²) between 2018 and 2022 in the Budapest office market



Source: Authors' analysis of compiled dataset

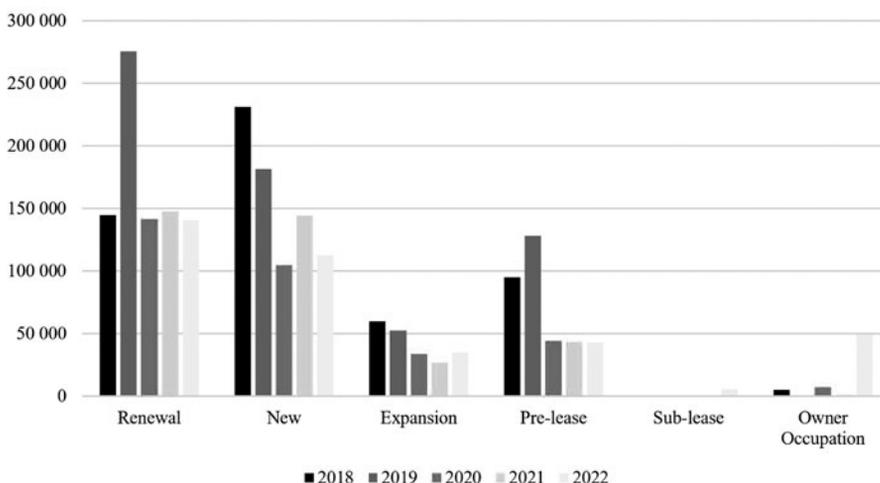
Table 3 Structure of office leasing deals (m²) between 2018 and 2022 in Budapest

Year	Renewal	New	Expansion	Pre-lease	Sub-lease	Owner Occupation
2018	144,584	230,866	60,019	94,902	0	5,284
2019	275,137	181,600	52,369	128,011	0	0
2020	141,366	104,571	33,750	44,306	0	7,480
2021	147,832	144,051	26,716	43,420	1,037	1,279
2022	140,528	112,534	35,044	43,003	5,653	49,512

Source: Authors' analysis of compiled dataset

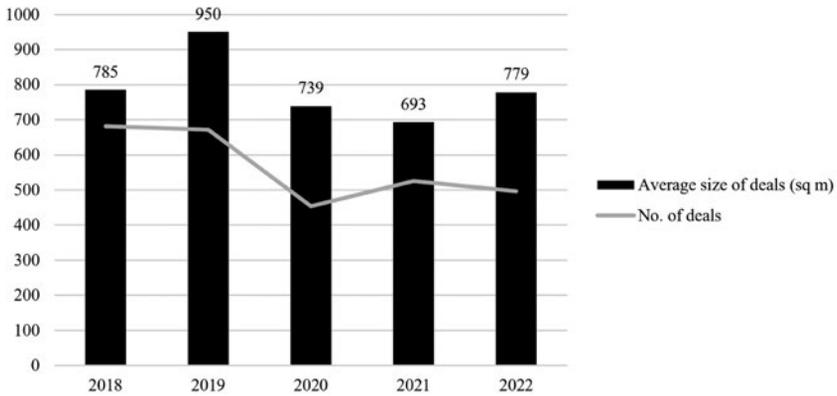
The level of expansion by existing tenants also dropped from 2019 levels between 2020 and 2022, although a 31% year-on-year increase was registered between 2021 and 2022, suggesting some recovery of the market. However, the 35,044 m² annual expansion volume in 2022 was still below the annual level of 50,000-60,000 m² of the pre-COVID years. Sub-leases appeared on the Budapest office market in 2021; however, there is no officially communicated data from the market actors about its real volume, and the registered seven thousand m² from 2021 and 2022 (combined) cannot be validated, as there may be more sub-lease agreements on the market that have not been reported by landlords or tenants. Two large headquarter buildings (developed by and for their respective company) were completed in 2022 in Budapest, which raised the volume of owner-occupation significantly last year and may distort the numbers presented in Table 3 by suggesting a more generalised trend of growth than is occurring.

Figure 2 The annual volume (m²) of office deal types in Budapest between 2018 and 2022



Source: Authors' analysis of compiled dataset

Figure 3 The number and average size of office leasing deals in Budapest between 2018 and 2022



Source: Authors analysis of compiled dataset

Figure 3 shows the number and average size of office leasing transactions in Budapest between 2018 and 2022. In 2019, which was the record year for the Budapest office market by the size of leased floor space, the average (mean) deal size was 950 m², as four large renewals and two pre-lease agreements above 10,000 m² were signed. In 2018 and 2019, the number of deals was above 670; however, since the Covid-19 pandemic hit, the number of deals significantly decreased to 451 in 2020, 526 contracts in 2021, and 496 in 2022, as can be seen in Figure 3. The average transaction size during the Covid-19 and post-Covid-19 years was not much smaller than it was in 2018, and after a 6% year-on-year decrease from 2021 to 2022, started to increase again in 2022, reaching 779 m².

Table 4 shows the average deal size (m²) in green-certified office building space and general (non-green-certified) office building space between 2018 and 2022. As can be seen, the average deal size was consistently higher for green-certified building space than for non-certified office building space; however, in 2022 the average deal size decreased in the case of green-certified office space market (by 13%) and significantly increased in the not-certified building space market (by 60%), which brought the two sectors closer in transaction size, with green-certified space still having a slight edge.

Table 4 Average office leasing deal sizes in green-certified and general buildings

Year	Average deal size in green-certified building space (m ²)	Average deal size in not certified building space (m ²)
2018	1,055	537
2019	1,196	711
2020	1,050	523
2021	1,004	437
2022	876	700

Source: Authors' analysis of compiled dataset

Deal size ranges are represented in Table 5. Data clearly show that there was little change in the share of the different deal size ranges between 2018 and 2022. The share of large, above 3,000 m² deals slightly decreased in 2022, whilst the share of leases signed between 500 and 999 m² increased by 5% in 2022 compared to 2021. However, these volume changes were not significant enough to establish an emerging trend.

In Table 6 we can see that that almost all of the most active tenant sectors on the market experienced a drop in the deal size in 2020.^[3] In 2021, most of the sectors began to recover; however, in 2022 (when the war started in Ukraine and the possibility of a new economic crisis appeared), the average deal size of several sectors decreased.

Following the data analysis, individual interviews were carried out with selected office market actors representing a cross-section of the industry. The participants represented the key stakeholders: developers, tenants, and real estate agents facilitating transactions.

All of the respondents agreed that the workplace-workspace trends have changed since the global pandemic and that tenants are looking for more flexible office lease agreements and solutions in the post-COVID-19 era. The respondents observed that the global pandemic led to a marked increase in remote work in the Hungarian market due to the implemented anti-virus measures (the *lockdown effect*). However, workers began to return to office in 2021 and 2022 – after the lockdowns ended – although remote is still more prevalent than it was in the *before Covid-19* (BC-19) era.

The participants observed that the hybrid working model (in which employees work from home either two or three days a week) has remained popular, even after the pandemic passed. However, two respondents claimed from the tenant side that their workers do not want to work from home anymore, as they miss their offices and workplace-related amenities.

Table 5 Percentage share of deal sizes according to calendar years, m²

Year	0–249 m ²	250–499	500–999	1,000–1,499	1,500–2,999	≥3,000
2018	28%	26%	20%	8%	10%	8%
2019	27%	23%	22%	8%	10%	10%
2020	29%	22%	23%	8%	10%	10%
2021	29%	27%	20%	8%	8%	8%
2022	28%	26%	25%	9%	7%	6%

Source: Authors' analysis of compiled dataset

[3] In the case of the Telecommunication sector, the size increase was due to a large pre-lease agreement in the first quarter of the year.

Table 6 Sectoral composition of office leasing, m²

Year	IT average deal size (m ²)	Telecommunication average deal size	Banking/Finance average deal size	Governmental average deal size	Industrial/Technology business average deal size
2018	796	1,980	1,160	3,113	617
2019	916	2,330	1,690	3,100	1,437
2020	730	2,949	827	1,389	522
2021	1,100	849	791	2,156	1,023
2022	679	630	1,596	1,513	1,177

Source: Authors' analysis of compiled dataset

Another important, discussed topic was the importance of green and sustainability efforts and strategies during the everyday work life. The respondents agreed that tenants had begun dedicating more attention to ESG and green strategies over the last several years, and several companies had become more focused on greening their operations. Also, the developers and real estate agents claimed that building retrofits leading to improved energy efficiency helps commercial buildings meet the conditions of international certifications, but these measures are not sufficient in themselves to achieve ESG goals. They also stated that based on their experience, to further their green credentials, companies rent office space in green-certified buildings, with many large international tenants only signing lease agreements for such facilities, which is evidenced by the consistently high demand for such space. This statement was also supported by the answers of the office tenant respondents at the interviews. Almost all of the participants also agreed on that health and safety-related features of office buildings have become a greater concern for tenants since the beginning of the global pandemic. This led the discussion to the importance of Indoor Environmental Quality. "Indoor Environmental Quality (IEQ) is most simply described as the conditions inside the building. It includes air quality, but also access to daylight and views, pleasant acoustic conditions, and occupant control over lighting and thermal comfort." (Rizk et al., 2017, 203) Almost all interview participants agreed on that since the appearance of Covid-19, office tenants pay larger attention to IEQ (mainly the air quality and ventilation) features of the office buildings as they are concerned about air filtering and the sterilization of the rooms. Also, the fitness and sport related building features (that are also viewed by occupiers as part of the sustainability and well-being package an office building can offer) are getting into more significance in the past years as tenants pay more attention to their workers' health status.

Based on the recorded and transcribed interview answers, large proportion of the tenants have been demanding green office properties. The respondents feel that there is

a lot of interdependence in the case of the market actors, that this was shown by Covid-19 and then by the explosion of energy prices. Technology change is mandatory, and financiers also take a close look at what projects they lend to, even if it is a new construction or a comprehensive renovation.

On the other hand, participants agreed, that office buildings that comply with ESG standards, have higher than average rents, regardless of the year they were built compared, to general offices. The rent level of sustainable buildings is determined by the reduction of negative environmental impacts (the lower level of carbon footprint), lower operation and maintenance costs, a better perception of the company associated with occupying sustainable office space, as well as a growing interest of office occupiers in sustainability and wider environmental impact compliance goals. In addition, it is also affected by the increase in the comfort, well-being and productivity of the tenants. The trend is further reinforced by government regulations that increasingly force tenants to report on their non-financial performance, such as ESG, globally. Based on the opinion of real estate agent respondents, the *green premium* for Budapest offices can be estimated at 9/10%, which is higher than the 5–7% typical in Warsaw or Bratislava, but lower than the 15–18% in Prague and Bucharest.

4. CONCLUSIONS

The goal of the research was to map the office tenants' size optimization attitudes since the global pandemic outburst: to evaluate the relationship between the increasing emphasis on remote work (partially as a result of Covid-19), environmental sustainability for buildings and office space, and larger financial concerns and the types and sizes of leasing and purchasing transactions for green-certified and non-green-certified spaces in Budapest before, during, and after the global pandemic.

The standard benchmark for comparing building assets is their market value. The location, prestige, technological quality, lease periods, and operational costs all have a significant impact on the rental level of a building. Rent and the vacancy rate control the cash flow generated by a property, which in turn affects its value.

In 2020, the global pandemic disrupted the economy. Lockdown procedures altered choices for working and living. Formerly bustling central business districts saw significant population declines, and remote work generated a significant rise in office vacancies, which decreased the value of office buildings. Market analysts and players anticipate this effect persisting for years.

Sustainability was already a growing concern for both tenants and landlords before the pandemic, but it accelerated major changes in the workplace, such as the growth of remote and flexible work models and a greater emphasis on corporate efficiency. Cost-cutting is a top priority in the highly competitive built environment sector, particularly in the post-Covid-19 era, and operational efficiency regarding environmental sustainability and energy use can result in significant cost savings. According to studies, green-certified buildings attract higher rents, presumably due to their economic advantages (amongst other regions).

This research analysed office market transactions from Budapest from 2018 to the end of 2022, augmenting these findings with interviews with office market actors on remote work, ESG and green strategies, and the future of office spaces. The statistical data for this research was collected from office market actors and included 2,826 office leasing transactions from 2018 to 2022, all of them signed in Class A and B modern office buildings.

The research aimed to understand how the Budapest office market reacted to the global pandemic, with particular emphasis on green-certified office space. Three hypotheses were tested:

- As remote working has widely spread in the global business world in the past 3 years, companies started to lease smaller office areas
- The reduction in lease sizes differed by tenant type, depending on the business sector in which a company operates.
- There was no significant deal size change (meaning overall value or m² of space leased) in the case of green-certified office buildings as a result of the pandemic due to their consistent popularity with tenants.

In 2019, the Budapest office market reached its all-time peak followed by a drop of 48% as a result of the 2020 pandemic. Although the volume of leases and space leased started to increase again in 2021, it was still 40% lower than at the end of 2022 than in 2019. The volume of renewals was relatively unchanged, remaining at nearly the 2019 level during the past three years.

While tenants who signed contracts during the past 3–5 years generally renewed their leasing contracts, the volume of new leases dropped both during and post-pandemic compared to 2018 and 2019. Expansions by existing tenants also dropped below 2019 levels in 2020 and 2022, although a 31% year-on-year increase occurred from 2021 to 2022, suggesting a partial market recovery, yet the annual expansion volume in 2022 was still well below that of the pre-Covid years.

In 2019 – a record year of the Budapest office market – the average lease was for 950 m², with four large renewal and two pre-lease agreements above 10,000 m² pushing the average to new heights. Despite the number of deals significantly decreasing during and immediately after Covid-19 (2020 and 2021), the average transaction size was not much smaller during these years than it was in 2018, and after a 6% year-on-year decrease from 2021 to 2022, average transaction size started to increase again in 2022 (779 m²). The average deal size was higher for green-certified buildings during all years studied compared to the traditional offices; however, the difference between green-certified and non-green-certified office space rental markedly decreased in 2022, when the average amount of space rented (deal size) for green-certified office assets declined by 13% and significantly increased for non-green-certified buildings (by 60%). There were no significant changes in the space/size breakdown percentages for office space rentals: The share of large deals/space rentals (above 3,000 m²) slightly decreased in 2022, whilst the share of leases signed between 500 and 999 m² increased by 5% in 2022 compared to 2021. However, such changes are insufficient to establish a long-term trend.

Almost all tenant sectors on the market experienced a drop in the deal size in 2020 when the global pandemic hit the economy and the office market. In 2021, most of the sectors started to recover; however, the beginning of the 2022 war in Ukraine and resultant market anxieties appeared to slow or reverse this recovery. The results of the data analysis proved the validity of hypotheses 1 and 2; however, disruptions to the economy caused by recent geopolitical changes have shifted leasing sentiment and harmed green-certified buildings' leasing performance.

The interviews confirmed the growing popularity of remote work in the Hungarian market, although its impact waned in 2021 and 2022. The hybrid working paradigm is still fairly common, and many businesses allow staff to work from home one to two days per week. However, there are instances where workers miss their workplaces and other office perks and no longer desire to work from home. ESG has gained importance in recent years, and many businesses now give priority to environmentally friendly operations.

This is evident given the persistent demand for green-certified office buildings and the fact that many major multinational tenants will only sign leases in green-certified buildings. Health and safety-related elements are also increasingly frequently requested by tenants. Even still, affordability is still a problem because it appears that recently there has been a decline in demand for newer, better-quality structures, which frequently have higher rental rates. In the case of Budapest offices, a 9-10% green premium rent level can be estimated compared to the general buildings. A more thorough justification might be offered by closer observation and examination of business dealings and building characteristics. Additionally, it will take some time to determine whether this is the beginning of a longer-term trend or only a sporadic short-term change in preference.

The study aimed at understanding changes of office rental in a specific geographical market area, Budapest, the capital city of Hungary. Further research would be needed to fully understand the specificities that make the Budapest market unique. We used statistics from landlords, the Budapest Research Forum (BRF) and office developers that helped us to understand the current rental trends and leasing contract volumes, however there were no available details on the sub-leasing market, therefore it would be an opportunity to further investigate this segment.

Another suggestion for further research is the comparison of the Hungarian capital's office market with other Central European cities' markets to monitor the trends, if there are similarities or any differences.

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