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The economic and spatial characteristics of the Hungarian office market – an SCP paradigm analysis with special focus on green activity

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This paper examines the structure and performance of the Budapest office market, with special focus on the green office building segment, as previously no such research was conducted. A so-called structure, conduct, and performance (SCP) paradigm typed analysis was conducted on 915 leasing transactions. Results showed that micro companies signed 41% of leasing contracts, with large corporations signing the highest volume. The green office market in Hungary expanded gradually, with 59% of the 915 transactions recorded in green-certified buildings. Micro companies signed 34% of the total number of green-certified transactions, followed by both large and small companies. Large corporations were responsible for 49% of office leasing transactions executed in green-certified buildings. The Hungarian office market was predominantly occupied by import-oriented companies, with 70% of transactions focused on imports and 30% on exports. There are some submarkets that are more popular among occupants, therefore the Hungarian office market can be categorized into clusters.

Keywords: office market, real estate, market analysis

The global office market is a complex ecosystem shaped by various factors including economic conditions, urbanization trends, technological advancements, and cultural shifts. The office market can be segmented based on various factors such as location (urban, suburban, rural), class (Class A, B, or C buildings), size (small, medium, large), and usage (corporate offices, coworking spaces, serviced offices) *(Gauger et al., 2021)*. The office market is subject to economic cycles, supply and demand dynamics, and regulatory changes. Factors such as interest rates, employment levels, and geopolitical events can influence market conditions

(Coën et al., 2022). Major cities around the world serve as key hubs for office spaces due to their economic significance, infrastructure, and connectivity. Globalization and urbanization are key trends shaping the office market structure. Globalization has led to the proliferation of multinational corporations and cross-border investment, driving demand for office space in major cities worldwide. Urbanization trends have concentrated economic activity in metropolitan areas, fueling demand for centrally located office spaces. As cities continue to grow and evolve, the office market is poised to play a central role in shaping urban landscapes and fostering economic development. Office buildings come in various types ranging from skyscrapers in central business districts to suburban office parks *(Gluszak et al., 2021; Kim et al., 2015; Oyedokun et al., 2015)*. These properties can be owned by institutional investors, real estate investment trusts (REITs), or private developers. Tenants in the office market include multinational corporations, startups, government agencies, and small to medium-sized enterprises (SMEs). Each tenant has different space requirements, lease terms, and budget considerations. Office leases can be structured in different ways including long-term leases, short-term leases, and coworking memberships. Lease terms typically include rent, maintenance fees, utilities, and taxes *(Coën et al., 2018; Liow–Schindler, 2017)*.

The integration of technology in office spaces has become increasingly important. Smart buildings equipped with Internet of Things (IoT) sensors, energy management systems, and advanced security features are becoming more common *(Daissaoui et al., 2020)*. Sustainability initiatives such as LEED certification and energy-efficient design are gaining traction in the global real estate market *(Ertl et al., 2021)*. Many tenants prioritize eco-friendly buildings and amenities to reduce their environmental footprint. Trends such as remote work, flexible office arrangements, and wellness-focused workplaces are shaping the future of the office market as developers and landlords are adapting to these trends by offering innovative solutions and amenities *(Sutton-Parker, 2021)*.

Understanding the office market structure allows investors to make informed decisions about where to allocate capital. Developers rely on research of the office market structure to inform their development strategies *(Coën–Lefebvre, 2022; Fonseca Santovito et al., 2002; Gluszak et al., 2021)*. By studying demand-supply dynamics, tenant preferences, and emerging trends, developers can identify market gaps, determine project feasibility, and design properties that meet evolving market needs. Businesses seeking office space need to research the market structure to make strategic decisions about location, size, and lease terms. By analyzing factors such as location suitability, rental rates, and amenities, occupiers can optimize their workspace environment, enhance employee productivity, and manage occupancy costs effectively *(Hendershott et al., 2010; Liow–Schindler,* *2017)*. Policymakers use research on the office market structure to formulate regulations and incentives that support economic development and urban planning goals. By understanding market dynamics and trends, policymakers can implement policies that promote sustainable growth, affordable housing, and vibrant urban centers *(Rebelo, 2011)*. Researching the office market structure provides valuable insights into broader economic trends and indicators. Changes in office market conditions often reflect shifts in consumer confidence, employment levels, and business activity, making it a useful barometer for economic health and resilience. Urban planners and city officials rely on research of the office market structure to guide urban development initiatives. By analyzing spatial patterns of office demand and supply, planners can optimize land use, transportation networks, and infrastructure investments to foster vibrant, inclusive, and sustainable urban environments. Businesses operating within the office market can gain a competitive advantage by conducting research on market structure. By staying abreast of market trends, competitors, and emerging technologies, firms can position themselves strategically, differentiate their offerings, and adapt to changing market conditions more effectively.

In essence, researching the office market structure enables stakeholders to make informed decisions, optimize resource allocation, and drive economic growth and development in both local and global contexts. This paper aims to investigate the structure and performance of the Budapest office market with special focus on the green office building segment to gain a better understanding of the current market trends. The authors performed a structure, conduct and performance (SCP) paradigm analysis on selected leasing transactions in the Budapest office market to test the following hypotheses:

– Typically, large sized multinational companies with a foreign background and import-oriented activity sign leases in green-certified office buildings in the Budapest office market, as opposed to predominantly small and micro-sized Hungarian companies.
– The spatial structure of the office market creates a typical, heatmap pattern as firms with similar characteristics and background prefer to lease office areas in same submarkets.

1. Background

The economic structure of a commercial real estate market encompasses various factors that influence supply, demand, pricing, and investment dynamics within the sector. Commercial real estate markets are segmented into different property types, including office, retail, industrial, hospitality (hotels), and mixed-use developments *(Robin, 2022)*. Each property type has its own supply-demand dynamics, vacancy rates, rental rates, and investment returns, influenced by economic factors and industry-specific trends. The commercial real estate market operates on the principles of supply and demand. Demand for commercial properties is driven by factors such as population growth, economic expansion, business investment, consumer spending, and industry trends. Supply is influenced by construction activity, zoning regulations, land availability, and development costs *(Edelstein–Liu, 2016)*. Occupancy rates, representing the proportion of leased or occupied space in commercial properties, and vacancy rates, indicating the proportion of unoccupied or available space, are key indicators of market health. Economic conditions, job growth, business expansion or contraction, and new supply affect occupancy and vacancy rates across different property types and submarkets. Rental rates in commercial real estate markets are influenced by supply-demand dynamics, property location, quality, amenities, and market conditions. Lease terms, including lease duration, escalation clauses, tenant improvements, and concessions, are negotiated based on tenant demand, landlord preferences, and market competitiveness *(Jones, 2021)*. Capitalization rates (cap rates) serve as a measure of investment yield in commercial real estate, calculated as the ratio of net operating income (NOI) to property value. Cap rates vary by property type, location, market conditions, and investor preferences. Lower cap rates indicate higher property values and lower investment yields, while higher cap rates suggest lower property values and higher investment yields *(Autio et al., 2023)*.

Economic factors such as GDP growth, employment rates, wages, inflation, interest rates, and consumer confidence impact commercial real estate markets. Positive economic indicators typically stimulate demand for commercial properties, while economic downturns can lead to reduced leasing activity, increased vacancies, and downward pressure on rents and property values. Commercial real estate financing is influenced by interest rates, lending standards, capital availability, and investor sentiment. Debt financing, equity financing, commercial mortgage-backed securities (CMBS), real estate investment trusts (REITs), and private equity funds are key sources of capital in the commercial real estate market, shaping investment activity and market liquidity *(Amédée-Manesme et al., 2015)*.

Commercial real estate markets exhibit localized dynamics influenced by regional economic conditions, demographic trends, regulatory environments, and industry clusters. Understanding local market fundamentals, tenant demand drivers, supply pipelines, and competitive landscapes is essential for effective investment, leasing, and property management strategies.

Occupant preferences are shaping the office market structure in profound ways, driving demand for flexible workspaces, amenities and experience-driven environments, technology-integrated solutions, sustainable and wellness-focused buildings, and well-located, accessible properties. Landlords, developers, and urban planners must understand and respond to these preferences by adapting their offerings to meet the evolving needs of tenants in a competitive market landscape. By prioritizing flexibility, experience, technology, sustainability, and location, stakeholders can create office environments that attract and retain tenants, foster productivity and innovation, and ultimately, drive long-term success and value in the office market *(Olszewski et al., 2024)*.

DiPasquale and Wheaton (1992) developed a dynamic model grounded in stock-flow theory that employs a four-quadrant representation to illustrate two significant interconnections between the space and asset markets that are in long-term equilibrium. The asset market is where investment decisions are made, whereas the space market is where use decisions are made. Their model emphasizes the significance of recognizing that the tenant space market and the investment asset market are two distinct but interrelated real estate markets. The four-quadrant representation incorporates diverse economic influences on real estate markets and the corresponding adjustments made to reach a state of long-term equilibrium.

The market equilibrium is established through an analysis of supply and demand. Its demand within the office sector is contingent upon the number of individuals occupying workspaces and the space requirement per employee. Consistent with economic theories, this framework is predicated on the notion that changes in the demand for space may result from factors such as employment level and/or economic expansion. As office space is a derived demand, this is predicated on the notion that as the economy grows, as measured by gross domestic product (GDP) or employment, companies will necessitate additional office space in order to accommodate their business expansion *(Ho et al., 2014)*. Given the probable correlation between GDP and employment, one of these variables could serve as a surrogate for office demand. As stated by *Jones (2021)*, *DiPasquale and Wehaton (1992)*, the ex-post measurement of office space demand can be achieved by calculating the occupied stock (OS), which represents the proportion of office inventory that is presently occupied.

1.1 Economic structure of the Hungarian market

Hungary's economic structure is characterized by a diverse mix of industries, with a significant focus on manufacturing, services, and agriculture. As a member of the European Union (EU) and a key player in Central and Eastern Europe (CEE), Hungary has undergone significant economic transformation since the regime change in 1989.

Manufacturing plays a crucial role in Hungary's economy, accounting for a significant share of industrial output and exports. Key manufacturing sectors include automotive, machinery and equipment, electronics, pharmaceuticals, chemicals, and food processing *(Völgyi, 2021)*. Hungary has attracted significant foreign investment in manufacturing, particularly from multinational corporations seeking access to skilled labor, competitive production costs, and strategic location within the EU market. The services sector is also a major contributor to Hungary's economy, encompassing a wide range of industries such as finance, real estate, telecommunications, transportation, tourism, and information technology (IT) services. Budapest, the capital city, serves as a major financial and business hub, hosting the headquarters of numerous domestic and international companies, as well as financial institutions, banks, and professional services firms. Agriculture has traditionally been an important sector in Hungary, although its contribution to GDP has declined over the years. Despite this, agriculture still plays a significant role in rural employment, food production, and exports. Hungary's agricultural sector produces a variety of crops, including cereals, fruits, vegetables, and wine grapes, as well as livestock such as pigs, cattle, and poultry *(Molnár–Hajdú, 2024; Yasmin et al., 2019)*.

Hungary has a relatively open economy and is heavily reliant on foreign trade, with exports and imports accounting for a significant share of GDP. Key export products include automotive parts and vehicles, machinery, electronics, pharmaceuticals, and food products. Germany, Austria, and other EU countries are major trading partners, while Hungary also has strong trade ties with countries in the CEE region, as well as with non-EU countries such as the United States and China *(Popescu et al., 2023)*. Hungary has been successful in attracting foreign direct investment (FDI), particularly in manufacturing, services, and technology sectors. Foreign companies are drawn to Hungary's skilled workforce, competitive operating costs, favorable business environment, and access to EU markets. Major multinational corporations have established production facilities, research and development centers, and regional headquarters in Hungary, contributing to economic growth and job creation. The country has developed modern infrastructure networks, including transportation, telecommunications, energy, and logistics, to support economic activities and facilitate trade and investment. Budapest is well-connected by road, rail, and air to major European cities, while the country's telecommunications infrastructure is advanced, with widespread access to high-speed internet and mobile services *(Popescu et al., 2023)*.

Despite its economic strengths, Hungary faces several challenges, including regional disparities, labor shortages, skills gaps, income inequality, and structural reforms. Additionally, the country's economy is vulnerable to external shocks and global economic uncertainties, including geopolitical tensions, trade disputes, and the impact of the Covid-19 pandemic.

Based on the data of the Hungarian Central Statistical Office (HCSO) in 2023, employment in the country – mainly due to the revival of the primary labor market – increased at a slower pace but continued compared to the previous year. Looking at the whole year, the average number of employed persons in the population aged 15–74 increased by 29 thousand to 4 million 724 thousand, with an employment rate of 74.8% on average. This rate was 4.4 percentage points higher than the EU average, thus placing Hungary in 8th place in the ranking of member states. Eleven years ago, Hungary still occupied 20th place, its current position has been stable for 4 years.

In 2023, the number of people employed in market services was characterized by an increase, while in public administration and the construction industry there was a decline during the year in the country. The number of employees increased in most branches, but a more significant decline occurred in public administration, defense and the construction industry (–3.1 thousand and –3 thousand people), and a smaller one in the transport and warehousing branch, agriculture and mining. The increase in the number of employees was driven by market services: the strongest increase in the number of employees was in professional, scientific and technical activities (9.4 thousand people), administrative services (7.7 thousand people), accommodation services, catering (6.7 thousand people) and information and communication branches (5.4 thousand people), to which, in addition to the still strong demand for additional labor, the expansion of the number of foreign workers and the increase in tourism turnover also contributed. In parallel with the decline in industrial production, the increase in the number of employed people in the industrial branches slowed down: in many branches of the manufacturing industry, which employs the most workers in the national economy, the number of employees increased less than in 2022, and in some branches, including heavy vehicle production and the plastics industry, the number of employees decreased.

The decline in construction industry production resulted in a decrease in the number of employees in the sector.

The slightly decreasing but still significant demand for labor at enterprises cannot be satisfied by the slightly increasing domestic labor reserve – partly due to the different structure – and therefore the number of foreign workers in the country has been increasing at an accelerating rate since 2021. In 2023, compared to the previous year, the number of employees with foreign citizenship increased by 11.7 thousand to 92.7 thousand, which is explained by a significant increase in the number of third-country workers. Most of them (5.1 thousand people) came from the Philippines, but the number of Vietnamese, Kyrgyz, Indian and Russian employees also increased significantly, while the largest number of Ukrainian, Slovak and Romanian workers decreased.

Nearly 900,000 enterprises operate in Hungary, 99.9 percent of which are classified as micro, small or medium-sized enterprises (SMEs). SMEs are therefore the backbone and mainstay of the Hungarian economy. These enterprises provide the employment of two-thirds of the Hungarian workers, thereby ensuring the existence of many families. Adapting to the green transition is a challenge for domestic enterprises, for now they do less for sustainability than their European Union counterparts. There are primarily financial obstacles for the domestic SME sector to increase its investment activity in the area of environmental protection or resource efficiency. Few enterprises export in Hungary, but the ratio of exporting SMEs is more favorable than the average of the V4 countries. At the same time, in Slovenia and Austria, three times more companies export than in Hungary, in terms of share. The concentration of exports is shown by the fact that the 20 largest companies in Hungary account for nearly 30 percent of export performance. Hungary's exports are diversified across various sectors, including automotive, machinery and equipment, electronics, pharmaceuticals, chemicals, and agricultural products. Automotive and automotive-related products, such as vehicle parts and accessories, constitute a significant portion of Hungary's exports, reflecting the presence of major automotive manufacturers and suppliers in the country. Hungary imports a wide range of goods, including machinery and equipment, energy products, chemicals, electronics, raw materials, and consumer goods. Machinery and equipment, including industrial machinery, electrical machinery, and telecommunications equipment, are among the largest import categories. Energy imports, including petroleum products and natural gas, also play a significant role in Hungary's import structure. Hungary's trade is diversified geographically, with its major trading partners including other European Union (EU) countries, particularly Germany, Austria, Slovakia, and Romania. Germany is Hungary's largest trading partner both in terms of exports and imports. Additionally, Hungary has trade relations with countries outside the EU, such as

China, Russia, the United States, and Japan. As a member of the European Union, Hungary benefits from preferential trade agreements and a single market, which facilitate trade with other EU member states. The EU is a key destination for Hungarian exports, and Hungary also sources a significant portion of its imports from other EU countries *(Lacka et al., 2020; Maduko, 2023)*.

Hungary's export-import market structure is closely linked to foreign direct investment and participation in global value chains *(Völgyi, 2021)*. Many multinational companies have established production facilities and supply chains in Hungary, contributing to both exports and imports of intermediate and finished goods. The Hungarian government has implemented various policies and initiatives to support export-oriented industries, attract foreign investment, and promote international trade. These include export promotion programs, investment incentives, and efforts to improve the business environment and infrastructure.

On the other hand, the country faces both challenges and opportunities in its export-import market. Challenges include external factors such as global economic uncertainty and trade tensions, as well as domestic issues such as labor shortages and infrastructure constraints. However, Hungary's strategic location, skilled workforce, and competitive manufacturing sector provide opportunities for further expansion of exports and participation in global value chains.

Based on the report of the National Bank of Hungary, in 2023, gross domestic product (GDP) was 0.9% lower in Hungary than the previous year based on raw data, and 0.7% lower than the previous year based on seasonally and calendar-adjusted and balanced data. Based on the National Bank of Hungary's analysis, real economic developments in 2023 were unfavorable to the commercial real estate sector. The contraction of real earnings caused by inflation was accompanied by a decline in domestic hotel guest nights and retail sales. Additionally, the decline in investment activity and GDP indicates a bleak outlook for the rental market in industrial-logistics and office properties. The escalating interest rates associated with EUR loans have exacerbated the region's abysmal real estate investment sentiment, which has persisted for the past year. International attention has been drawn to the risks associated with commercial real estate, and all of the major central banks have highlighted these risks in their reports on financial stability. Demand for office space in Budapest is driven by a variety of factors, including economic growth, increasing foreign investment, and a growing presence of multinational corporations and domestic companies. Key demand drivers include the expansion of technology firms, shared services centers, financial institutions, and professional services firms, as well as the emergence of coworking and flexible office space operators catering to startups and freelancers.

2. Research method

2.1 Structure, conduct, and performance (SCP) paradigm

In the realm of consumer behavior and marketing, based on the existing literature the term of SCP paradigm stands as a fundamental framework for understanding how consumers or clients make decisions and how firms can respond effectively. SCP encapsulates a systematic approach to market analysis and strategy development. This paradigm has been pivotal in guiding businesses toward successful market penetration, differentiation, and sustainable growth *(Panhans, 2023)*.

At the core of the SCP paradigm lies segmentation, the process of dividing a heterogeneous market into distinct and homogeneous groups of consumers/clients who share similar needs, preferences, or characteristics. Market segmentation recognizes the diversity among consumers and acknowledges that a one-size-fits-all approach is seldom effective in meeting their varied demands. By identifying segments based on demographic, psychographic, behavioral, or geographic factors, businesses can tailor their marketing efforts and offerings to resonate more deeply with specific consumer groups. Segmentation enables firms to allocate resources efficiently, prioritize target audiences, and craft customized marketing messages that resonate with the unique needs and desires of each segment *(Bourai et al., 2024)*.

Once segments are identified, the next step in the SCP paradigm is targeting – the strategic selection of one or more segments that the firm will prioritize and focus its marketing efforts on. Targeting involves evaluating the attractiveness of each segment based on factors such as size, growth potential, profitability, competition, and compatibility with the firm's resources and capabilities. Through careful analysis, firms can pinpoint the segments that offer the greatest potential for success and align with their strategic objectives. Targeting allows businesses to concentrate their resources and attention on segments where they can achieve a competitive advantage and maximize their return on investment. By narrowing their focus, firms can allocate resources more effectively, develop tailored marketing strategies, and establish stronger connections with their target consumers *(Lelissa–Kuhil, 2018)*.

The final component of the SCP paradigm is positioning – the process of creating a distinct and desirable perception of the firm's offerings in the minds of target consumers relative to competitors. Positioning involves crafting a unique value proposition and communicating it effectively to the target audience. It requires a deep understanding of consumer needs, competitor offerings, and market dynamics to identify opportunities for differentiation and value creation. Effective positioning enables firms to carve out a meaningful and sustainable competitive advantage by highlighting the unique benefits, features, or attributes of their products or services that resonate with target consumers. Through strategic messaging, branding, and marketing communications, firms can shape perceptions, influence preferences, and establish a strong emotional connection with their target audience *(Panhans, 2023)*.

The SCP paradigm finds widespread application across various industries and sectors, ranging from consumer goods and retail to services, healthcare, real estate developments and beyond. By systematically analyzing markets, identifying segments, prioritizing targets, and crafting compelling positions, firms can enhance their competitiveness, drive customer acquisition and retention, and achieve long-term growth and profitability. Moreover, the SCP paradigm provides a structured framework for decision-making, enabling firms to make informed choices about resource allocation, marketing strategy, product development, and market entry. In today's dynamic and highly competitive business environment, where consumer preferences are constantly evolving and market landscapes are continually shifting, the SCP paradigm offers a strategic roadmap for navigating complexity, seizing opportunities, and staying ahead of the curve.

By applying an SCP paradigm analysis in the real estate market, property developers, agents, and investors can better understand their target audiences, and position their properties effectively to meet the diverse needs and preferences of buyers or tenants. This approach can lead to improved market penetration, higher sales or leasing rates, and increased competitiveness in the real estate market.

2.2 Data collection and analysis

Hungary's strategic location at the crossroads of Europe, coupled with its well-developed transportation network and access to EU funding, has positioned Budapest as a leading destination for business investment and expansion. The city's strong economic fundamentals, low corporate tax rates, and skilled workforce contribute to its attractiveness as a business location, driving demand for office space in key commercial districts. The Budapest office market has experienced significant growth and transformation in the past decade, driven by favorable economic conditions, increasing foreign investment, and a burgeoning technology sector. As the capital city of Hungary and a key business hub in Central and Eastern Europe, Budapest has emerged as an attractive destination for companies seeking strategic locations, skilled talent pools, and competitive operating costs. Based on the city’s share in the Hungarian office market (ca. 98% of the modern office buildings of Hungary are located in the city), the authors decided to examine the city's office market details to represent the country's office market characteristics.

Within the framework of this research, the authors collected detailed office leasing transaction data from the Budapest office market with the support of landlords, office agencies and office occupant companies. The examined period included years between 2018 and 2021 to be able to get data samples before, during and after the outburst of the global pandemic situation. In addition, detailed research was conducted in the Hungarian Company Database to collect economic data about the listed occupants of the office market.

Finally, a total number of 915 transactions were collected with the following details:

Table 1

Details and types of the collected data

Date	Year, quarter
Deal	Type (new, renewal, expansion, pre-lease, owner occupation), size (m^2)
Building	Name, location, green certification (if any)
Occupant	Nationality (Hungarian or multinational), operation profile (governmental bodies and ministries were not included), company registration number
Economic data of the occupant	Export/import profile, company size

As governmental institutions do not have company numbers or detailed economic data in the Hungarian Company Database, these occupants were not included.

Applying the SCP paradigm in the office market involves understanding the diverse needs and preferences of property occupants, identifying specific market segments, and positioning office buildings to meet the demands of those segments effectively. The following steps show how the SCP paradigm was applied in the Hungarian office market by the authors:

Table 2

Data analysis with the help of SCP paradigm

Segmentation	Segmentation variables in the office market can include factors such as company size (small businesses, micro businesses, large corporations, etc.), nationality (Hungarian, multinational) or economic profile (export/import orientation). With analyzing the market data and trends it was able to identify distinct segments within the office market. It was also able to develop detailed profiles for each segment, including their size, office space needs, profile and location preferences.
Targeting	Based on the market data, the authors assessed the attractiveness of each office location and building segment (green-certified or general) based on factors such as size and annual leasing rates by the occupants to see, which tenant type prefers the exact submarket/location and building type.
Positioning	With the leasing data analysis, it was able to identify competitive advantages: the authors identified the unique selling points and competitive advantages of different office properties and locations compared to others in the Budapest office market.

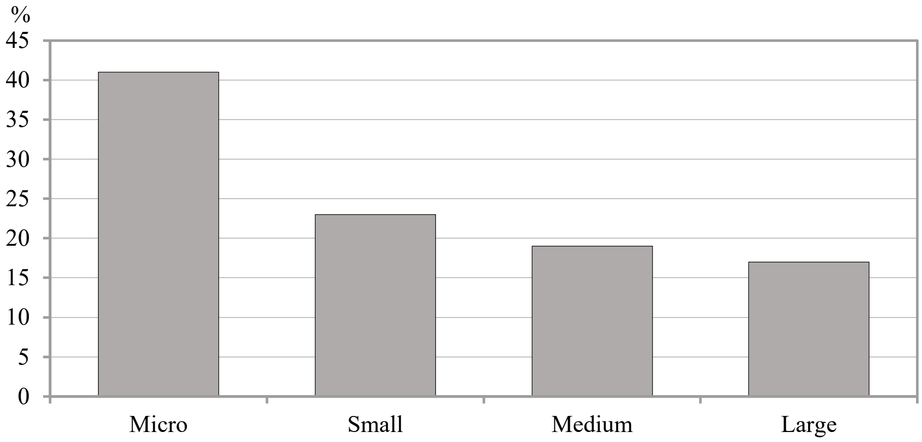
3. Results

Based on the analysis of the 915 office market transactions, the following results can be stated.

On the Hungarian office market, the activity rate of micro companies is the highest, they signed 41% of the leasing contracts in the examined period, between 2018 and 2021, which is illustrated in Figure 1 below. Considering that the ratio of small and micro enterprises is strongly overrepresented in the Hungarian economy, this result can be deduced from this market characteristic.

Figure 1

The activity of company types in the Budapest office market between 2018–2021, based on number of transactions



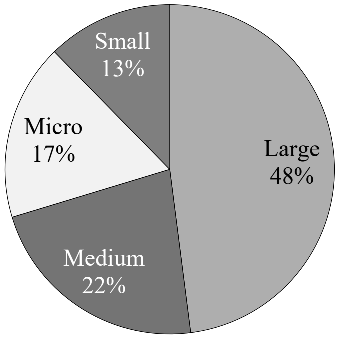
Source: author's computation.

On the other hand, in case of leasing transactions share (how many m^2-s were signed in the period), large companies signed the largest volume (48%), followed by medium sized companies (22%) as it is illustrated in Figure 2.

The average transaction size of large companies was 2,944 m^2 between 2018 and 2021, whilst in the case of medium sized firms it was 1,244 m^2. 564 m^2 was the average transaction size of medium companies and 447 m^2 of the micro companies. The largest transaction was signed in 2019 with the size of 27,333 m^2. From the 915 collected leasing transactions, only three were above 20,000 m^2, all of them were signed by large companies. 10 deals were signed between 10,000 m^2 and 19,999 m^2, from which one transaction was made by a medium sized company and nine were signed by large companies.

Figure 2

Leasing share of company types between 2018–2021, based on m^2



Source: author's computation.

Hungary's green office market was steadily growing, albeit at a slower pace compared to some Western European countries. Green buildings, which prioritize sustainability and energy efficiency, were gaining traction due to increasing environmental awareness and regulatory pressures. The Hungarian government, in line with EU directives, has been implementing policies to promote energy efficiency and sustainable building practices. These regulations have influenced developers and investors to adopt green building standards. On the other hand, many multinational corporations and domestic companies operating in Hungary have sustainability goals. They seek office spaces that align with their environmental commitments, thereby driving demand for green buildings. Tenants are increasingly recognizing the benefits of occupying green office spaces, such as improved indoor air quality, better lighting, and overall occupant comfort. This demand incentivizes developers to invest in sustainable building designs and certifications. Certification programs like LEED (Leadership in Energy and Environmental Design) and BREEAM (Building Research Establishment Environmental Assessment Method) provide internationally recognized standards for green buildings. The pursuit of these certifications by developers enhances the credibility and marketability of their office properties in the Budapest office market.

Regarding green-certified office building transactions the following results were obtained.

From the 915 collected transactions, 540 was registered in green-certified office buildings (59%).

Table 3

Share of green-certified office building transactions by company type from the total number of green-certified office building transactions

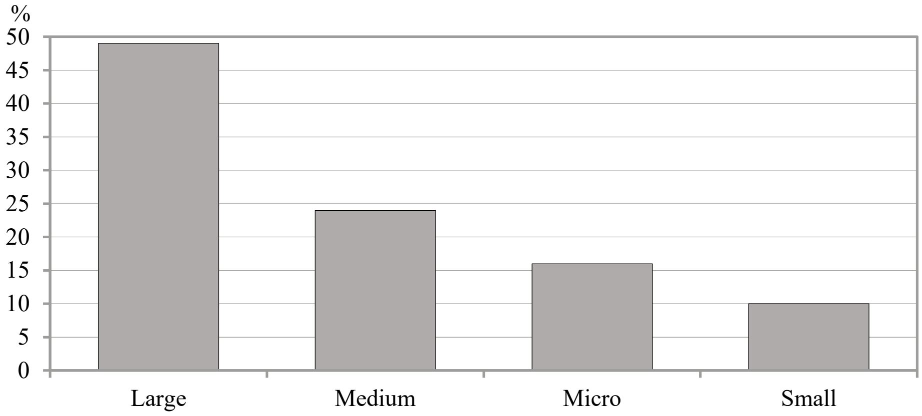
Micro	34%
Large	22%
Small	22%
Medium	21%

Source: author's computation.

As it is shown in Table 3, from the total number of green-certified office building transactions, 34% was signed by micro companies, followed by large and small companies (22-22%), and the share of medium companies from the total number of green-certified office building transactions was 21%. Although the overrepresentation of micro companies from the total number of green-certified office building transactions can be interpreted as the natural result of their large share in the country's economy, it can be stated that based on the number of the transactions, green-certified office buildings are almost equally important to all of the company types in the market.

Figure 3

Share of green-certified office building transactions by company type from the total leasing volume (m^2) between 2018–2021



Source: author's computation.

Figure 3 shows that based on the m^2 volume of transactions, large companies were responsible for 49% of the office leasing transactions signed in green-certified buildings. This was followed by medium sized companies (24%) and micro companies also took a bigger share (16%) from the total green-certified building leasing volume than the small companies (10%).

Based on the analyzation of company profiles and corporate operation fields, this could be the result of co-working and serviced office provider companies. Co-working and serviced office spaces have become increasingly popular in Hungary in the past years, catering to freelancers, startups, remote workers, and even established companies looking for flexible office solutions. Based on the leasing data analysis, there is a growing awareness of sustainability and wellness among co-working and serviced office space operators and members as many of them rent in green-certified office buildings. Based on the Hungarian Company Register's database, these companies are usually registered as micro companies although they are occupying large office areas in buildings for their possible desk renting clients.

Table 4

Share of green-certified office building transactions by company type, annually between 2018 and 2021

(%)

Company type	2018	2019	2020	2021
Small	60	57	67	44
Medium	74	56	66	68
Micro	54	54	27	50
Large	95	69	65	77

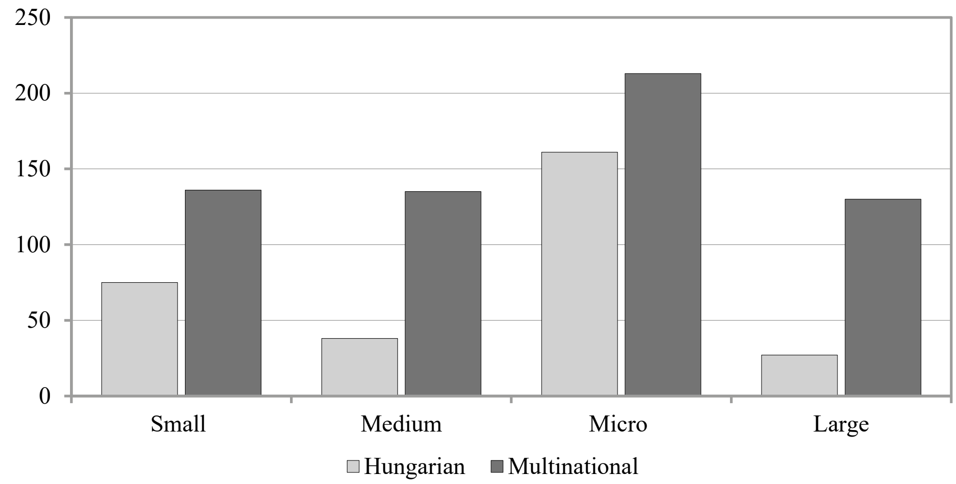
Source: author's computation.

As the global pandemic situation entered to the office market, it was able to detect some rearrangements in the leasing trends regarding the activity of company types. Table 4 shows that how the share of green-certified office building leasing transactions changed between 2018 and 2021 in the case of different sized companies. In the case of small companies, after the outbreak of Covid-19, the number of transactions signed in green-certified offices began to decrease. In the case of medium-sized companies, there was a decline after 2018, but since then the number of contracts signed in green certified offices has been continuously increased until the end of 2021, which has not changed even the appearance of the global pandemic. The biggest decline in green rental activity was felt in the case of micro-enterprises during the Covid-19 outburst in 2020 (from 54% to 27%), and since then it has been increasing again, but has not reached the level before Covid. This can also be connected with co-working and serviced office provider micro companies, as with the spread of remote work and home office, these service provider companies started to restrain their activity on the office market, prepared for the assumption that there may be less demand for the serviced offices. In the case of large companies, 2018 was a record year in terms of leases signed in green office buildings, and Covid-19 did not really dampen their momentum in their case either, after which their activity in the green office market began to rise again in 2021.

Regarding nationality, it can be stated that based on the examined 915 transactions between 2018 and 2021, the Hungarian modern office market is dominated by multinational companies. 614 transactions (67% of the total number of examined transactions) were signed by non-Hungarian corporations. In the breakdown by company type, the proportion of multinational companies is also high as it can be seen below in Figure 4:

Figure 4

Number of transactions by company type between 2018–2021



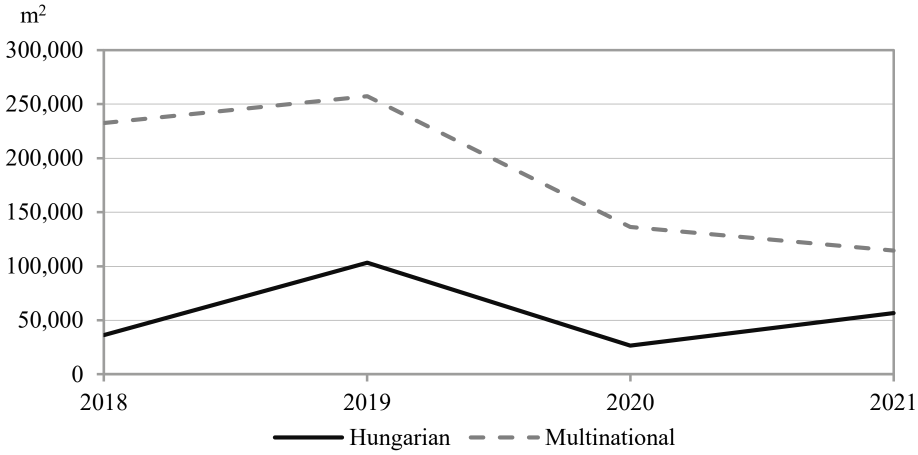
Source: author's computation.

Based on Figure 4, in all size types the proportion of multinational companies were higher than the Hungarian ones. The highest difference was registered in the case of large companies, where the share of non-Hungarian market actors was 83% (130 companies) versus the Hungarian-owned 17% (27 companies). The most multinational companies are registered as micro enterprises (213 firms), similarly to Hungarians (161 firms). Only 17 Hungarian companies were registered as large corporates, and the number of medium-sized enterprises is also small compared to the multinational companies (38 versus 135).

The level of office leasing activity based on nationality can be seen on Figure 5 below. Based on the results of the data analysis, it can be stated that the leasing activity gap between the Hungarian and multinational office occupants started to decrease since 2020.

Figure 5

Office leasing activity



Source: author's computation.

The data analysis showed that multinational occupants' leasing activity in green-certified office buildings was significantly higher as between 2018 and 2021, as 83% of green office market deals were signed by them. Table 5 below shows the annual leasing activity in m^2 in green-certified office buildings by company type and size between 2018 and 2021. It can be seen that the least active year for Hungarian companies in the green office market was 2020, when the global pandemic appeared. The annual leasing activity of Hungarian micro enterprises did not reach 1,000 m^2, which compared to their peak of 11,548 m^2 in 2019 shows a massive decrease. However, in 2021, they presented a ca. 450% activity growth, whilst in the case of multinational micro companies, the growth rate from 2020 to 2021 was ca. 137%.

Large multinational companies reached their record high in 2018 during the examined period, however their activity fell back by ca. 50% in 2020 and there was only a small year-on-year growth level in 2021 at 4% in their case.

Small Hungarian companies were the most active in 2018 in the green office market, and after the first Covid-19 shock, in 2021 they started to increase their leasing activity again. In contrary, small multinational companies reached their highest activity in 2019, they decreased their activity in 2020 by ca. 5% and a further year-on-year decrease of 45% in 2021 again. In the case of medium-sized enterprises, the 2018 and 2019 activity level of Hungarian companies were around the same volume, whilst in 2020 it decreased by ca. 53%. In 2021, the green office market leasing transaction volume of Hungarian medium-sized companies increased by ca. 250% to 6,511 m^2 compared to 2020. The activity of multinational medium-sized corporates in green-certified office assets fell back by 42% and they only generated a moderate, ca. 11% year-on-year growth in 2021.

Table 5

Leasing activity in green-certified office building transactions by company type and size, annually between 2018 and 2021

(m^2)

Denomination	Small	Medium	Micro	Large	Total
2018	19,801	55,290	42,379	94,660	212,130
Hungarian	4,727	5,442	7,760	3,574	21,503
Multinational	15,074	49,848	34,619	91,086	190,627
2019	21,199	47,387	44,907	120,904	234,397
Hungarian	4,190	5,464	11,548	30,860	52,062
Multinational	17,009	41,923	33,359	90,044	182,335
2020	17,784	26,789	8,068	51,215	103,856
Hungarian	1,630	2,542	986	4,384	9,542
Multinational	16,154	24,247	7,082	46,831	94,314
2021	11,265	33,635	14,209	64,595	123,704
Hungarian	2,337	6,511	4,474	15,713	29,035
Multinational	8,928	27,124	9,735	48,882	94,669
Total	70,049	163,101	109,563	331,374	674,087

Source: author's computation.

During the Covid-19 pandemic, the Hungarian government implemented various measures to mitigate the economic impact and protect citizens. This included the implementation of various support measures for businesses, workers, and vulnerable groups. The main steps were financial assistance, tax relief, loan guarantees, and wage subsidies to help businesses retain employees and stay afloat during lockdowns and economic downturns *(Kollo–Reizer, 2021)*. Based on the data of Table 5, it can be said that in most company-size types, Hungarian market actors suffered a more drastic activity fell back in green-certified office buildings than multinational enterprises, however, they caught up faster in 2021 than the foreign market actors.

Examining the activities of the companies, the results of the database show that predominantly import-oriented companies were present on the Hungarian office market between 2018 and 2021. This means that 70% of the 915 examined transactions were signed by import-oriented enterprises and 30% was generated by mostly export-oriented companies.

Table 6

Share of export and import-oriented companies by size in the case of signed leasing transactions between 2018 and 2021

(%)

Company type	Share of export-oriented	Share of import-oriented
Micro	33	67
Small	18	82
Medium	32	68
Large	34	66

Source: author's computation.

The share of signed transactions by export-oriented companies were at almost same level in every company type (between 32-34%), except for small companies, in which case it was significantly less, only 18%. In terms of nationality, only 56 out of 271 transactions concluded by export-oriented companies between 2018 and 2021 were signed by Hungarian enterprises (ca. 21%). This means that between 2018 and 2021, 79% of transactions by export-oriented companies in the Hungarian office market were signed by multinationals.

Based on the data analysis of leasing transactions signed in green-certified office buildings, 64% of them were signed by import-oriented companies.

Budapest, as the capital city of Hungary, boasts a diverse office market with eight submarkets catering to different tenant preferences, industries, and business needs:

- The Central Business District (CBD) is the heart of Budapest's office market, characterized by prestigious addresses, historic buildings, and also modern office buildings. It hosts a mix of multinational corporations, financial institutions, law firms, and professional services firms. The CBD offers excellent accessibility, amenities, and proximity to government institutions, cultural attractions, and transportation hubs.
- The Central Pest submarket is a vibrant and dynamic commercial district around the CBD submarket, that serves as the economic and cultural center of Budapest. Its prime location, high-quality office buildings, diverse tenant mix, excellent accessibility, and extensive amenities make it a sought-after destination for businesses looking to establish a presence in the Hungarian capital.
- The Central Buda submarket is the commercial area situated on the Buda side of the Danube River in Budapest, Hungary. While not as prominent as the CBD office submarket, Central Buda offers its own distinct advantages and characteristics as it offers a unique blend of historic charm, scenic beauty, and business opportunities. While smaller in scale compared to the

Central Pest submarket, it provides an alternative location for businesses seeking a distinctive setting with access to amenities and services.

- The Váci Corridor office submarket is the most prominent, popular and dynamic commercial districts in Budapest, Hungary. It is situated along Váci Road, one of the main thoroughfares running through the northern part of the city. This submarket is a thriving commercial district with modern infrastructure, diverse amenities, and a strong business community. Its strategic location, competitive rental rates, and focus on innovation make it an attractive destination for businesses looking to establish a presence in Budapest.
- The Non-Central Pest office submarket offers an alternative to the central districts of Budapest, providing affordable office space in mixed-use environments with access to amenities and transportation networks. It appeals to businesses seeking cost-effective solutions outside the city center while still benefiting from the advantages of being located in Hungary's capital city.
- The North Buda office submarket refers to the commercial district located on the Buda side of the Danube River in the northern part of Budapest, Hungary. It is situated north of the city center and is known for its residential neighborhoods, green spaces, and scenic views. While primarily known for residential areas, North Buda has seen the development of mixed-use projects that incorporate office space along with residential, retail, and leisure components. These developments aim to create integrated urban environments that cater to the diverse needs of residents and businesses.
- The South Buda office submarket refers to the commercial district situated on the Buda side of the Danube River in the southern part of the city. The submarket features office parks, business complexes, and mixed-use developments that offer modern office space with amenities such as parking facilities, green areas, and recreational amenities. These developments cater to businesses looking for office space outside the city center.
- Periphery: it covers non-Budapest locations, situated in 5–10 km vicinity of Budapest. It includes a large amount of logistics parks and warehouse office areas.

Table 7 below shows the spatial structure and distribution of companies in the different office submarkets based on the share of transactions. There is only one submarket, where Hungarian companies took the bigger share from office transactions between 2018 and 2021, Non-Central Pest. Furthermore, as it can be seen in Table 7, in the case of North Buda, the Hungarian and Multinational companies' activity reached the same share of 50% in the examined period.

Table 7
Share of transactions by occupant nationality in the office submarkets of Budapest

(%)

	2018	2019	2020	2021	Total
Central Business District					
Hungarian	23	38	26	54	32
Multinational	77	62	74	46	68
Central Buda					
Hungarian	45	40	10	49	35
Multinational	55	60	90	51	65
Central Pest					
Hungarian	15	74	40	18	47
Multinational	85	26	60	82	53
Non-Central Pest					
Hungarian	57	76	25	79	64
Multinational	43	24	75	21	36
North Buda					
Hungarian	42	46	88	59	50
Multinational	58	54	12	41	50
Periphery					
Hungarian	56	56	24	28	39
Multinational	44	44	76	72	61
South Buda					
Hungarian	8	13	6	20	11
Multinational	92	87	94	80	89
Váci Corridor					
Hungarian	16	8	22	50	20
Multinational	84	92	78	50	80

Source: author's computation.

As it can be seen in Table 7, in 2020, when the Covid-19 pandemic broke out, the share of foreign companies increased everywhere, with the exception of North Buda submarket, as the transaction share of Hungarian companies decreased in all submarkets. This shows that Hungarian companies reacted more quickly to the threat of the crisis. On the other hand, in 2021, it is visible that the share of Hungarian market actors' transactions became more robust in several submarkets. Based on the data analysis, most multinational companies are located in the Váci Corridor submarket, whilst the most Hungarian enterprises are renting office space in the North Buda submarket.

Table 8

Volume of transactions in m2 by occupant nationality and company size in Budapest between 2018 and 2021

(m^2)

Denomination	Hungarian	Multinational
Central Business District	13,731	59,535
Small	5,905	9,890
Medium	839	10,257
Micro	6,897	21,918
Large	90	17,470
Central Buda	26,472	78,200
Small	4,473	25,348
Medium	12,916	21,694
Micro	8,545	14,639
Large	538	16,519
Central Pest	46,806	91,213
Small	3,994	11,388
Medium	5,634	13,443
Micro	4,453	14,631
Large	32,725	51,751
Non-Central Pest	42,814	23,454
Small	6,303	,398
Medium	3,422	10,222
Micro	5,490	5,477
Large	27,599	7,357
North Buda	10,468	18,205
Small	4,059	4,827
Medium	1,100	6,387
Micro	4,096	1,291
Large	1,213	5,700
Periphery	8,580	15,092
Small	2,083	2,054
Medium	2,157	6,606
Micro	4,317	3,857
Large	23	2,575
South Buda	15,012	167,498
Small	3,447	10,175
Medium	5,171	43,874
Micro	3,750	24,024
Large	2,644	89,425
Váci Corridor	58,885	287,891
Small	5,633	19,037
Medium	1,228	70,350
Micro	12,739	31,074
Large	39,285	167,430

Source: author's computation.

Table 8 shows the volume of transactions in m^2 by occupant nationality and company size in Budapest between 2018 and 2021. As it can be seen, the largest transaction volumes signed by Hungarian micro enterprises appeared in the Váci Corridor (12,739 m^2) and Central Buda (8,545 m^2) submarkets. The largest volume of transactions by small Hungarian companies was signed in the Non-Central Pest submarket, with a total of 6,303 m^2. Large Hungarian companies mostly preferred the Váci Corridor and Central Pest submarkets in the examined period.

In Table 8 it can be, seen that most multinational large companies signed deals in the Váci Corridor between 2018 and 2021 (167,430 m^2 in total), whilst their smallest activity was registered in the Periphery submarket (2,575 m^2). Medium-sized multinational enterprises preferred most the Váci Corridor and South Buda submarkets. The largest transaction volume of small multinational firms was signed in Central Buda with 25,348 m^2, whilst foreign micro enterprises signed most of their transactions in the Váci Corridor and South Buda submarkets.

Examining the possibility of clusters or heatmap distribution of different company types in the submarkets, the following typical locations can be differentiated:

- Both multinational and Hungarian large companies mostly prefer the Váci Corridor submarket as 47% of the multinational and 38% of the Hungarian large enterprises' transaction volume were registered in this location.
- In the case of Hungarian large companies, there is a second major cluster in Central Pest, as 31% of their registered deal volume was signed in this submarket.
- 40% of the office leasing transactions of medium-sized Hungarian enterprises was signed in Central Buda in the examined period.
- Small multinational companies located the 30% of their transactions in Central Buda
- Medium-sized multinational firms mostly prefer the Váci Corridor, as 38% of their transaction volume was registered in this submarket
- 25% of the activity of Hungarian micro enterprises took place in the Váci Corridor submarket.

4. Conclusion

Conducting research on the structure of the office market empowers stakeholders to make well-informed decisions and stimulate economic expansion and progress on a local and international scale. Strategic planning and innovation are all underpinned by it in the interconnected and ever-evolving domain of commercial real estate. To acquire a better understanding of current market trends, this paper investigated the structure and performance of the Budapest office market, with a particular emphasis on the green office building segment. A structure, conduct, and performance (SCP) paradigm analysis was conducted by the authors on a subset of a total number of 915 leasing transactions within the Budapest office market. Based on the results, between 2018 and 2021, micro companies in Budapest signed 41% of leasing contracts in the office market, with large corporations signing the highest m^2 volume of leasing transactions. The green office market in Hungary expanded gradually in the past years, as 59% of the 915 transactions was recorded in green-certified office buildings. Micro companies signed 34% of the total number of green-certified transactions, followed by both large and small companies (22-22%). Medium companies accounted for 21% of the total number of green-certified office building transactions. Large corporations were responsible for 49% of office leasing transactions executed in green-certified office buildings. Medium-sized enterprises (24%) and micro enterprises (16%) accounted for a greater proportion of the overall leasing volume of green-certified buildings compared to small enterprises (10%).

Co-working and serviced office provider businesses have grown in popularity in Hungary in the past years, attracting freelancers, entrepreneurs, remote workers, and established businesses seeking adaptable office solutions. The Hungarian Company Register database classified these organizations as micro-enterprises despite their expansive office spaces as they usually employ a very limited number of workers. The Covid-19 pandemic led to reorganizations in leasing trends, with small businesses experiencing a decline in green-certified office transactions. However, the trend reversed by the end of 2021, and micro-enterprises experienced a significant decline in green rental activity during the pandemic. Signing of leases in green office buildings by large corporations reached an all-time high in 2018, and their engagement in the green office market resumed in 2021, after the first pandemic shock.

Based on the analysis of the 915 transactions, multinational corporations dominate the Hungarian modern office market. Non-Hungarian corporations signed 614 transactions, contributing to 67% of the total number examined. Large corporations accounted for 83% of the transactions. The global pandemic in 2020 marked the lowest level of activity in the green office market, with micro enterprises experiencing a significant decline in leasing activity.

In terms of transactions, large multinational corporations peaked in 2018 but experienced a 50% decline in 2020 and a modest 4% year-on-year growth in 2021.

The Hungarian office market was predominantly occupied by import-oriented companies, with 70% of the 915 transactions executed by enterprises focused on imports and 30% of companies primarily focused on exports. Export-oriented multinational corporations signed 79% of company transactions on the Hungarian office market between 2018 and 2021. Import-oriented companies executed 64 percent of the agreements in green-certified office buildings.

Large multinational and Hungarian corporations prefer the Váci Corridor submarket, accounting for 47% of the transaction volume of multinational corporations and 38% of the transaction volume of Hungarian large corporations. Central Pest is home to a secondary cluster of large companies based in Hungary, accounting for 31% of the transaction volume. Large multinational corporations favor the Váci Corridor submarket, with 25% of the activity of Hungarian microbusinesses occurring in this submarket.

Based on the results of the market analysis, it can be stated that the two hypotheses formulated at the beginning of the research were partially supported.

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