

Leading approaches to planning and construction of modern business parks and office centres

Turar Uzakbayev

Kazakh Leading Academy of Architecture and Civil Engineering (KazGASA)

Ryskulbekov street 28, 050043 Almaty

Republic of Kazakhstan

e-mail: uzakbaev_turar@mail.ru

Lyazzat Nurkusheva

Kazakh Leading Academy of Architecture and Civil Engineering (KazGASA)

Ryskulbekov street 28, 050043 Almaty

Republic of Kazakhstan

e-mail: nur_lyazzat@inbox.ru

Vladimir Sidorov

Sochi State University

Sovetskaya street 26a, 354000 Sochi

Russian Federation

e-mail: fda_sidorov@mail.ru

Abstract Our paper focuses on the leading approaches to planning and construction of business parks that represent the novel type of office buildings. Business parks gained wide popularity in the past several decades and now represent the fastest-growing segment of the office building stock.

Nowadays, planning and construction of modern business parks and office centres involves maintaining a certain code and specific rules that involve sustainability, energy efficiency, energy saving, and the use of renewable energy sources (RES). We find that the requirements for the office buildings in the 21st century are quite different and more fastidious than those imposed in the previous century.

Our analysis reveals that the prerequisites for urban planning and architecture connected to modern business parks is quite similar worldwide. It appears that all projects follow the same pattern and copy each other functionality and other feature. Moreover, it appears that the usage of modern office building is also following the same pattern with coworking being on the rise as the number of global nomads is increasing.

Our results show that modern business parks and office centres constitute the new step in the modernisation and the development of the global and digital economy, yet they are required as the hubs for socialisation and networking.

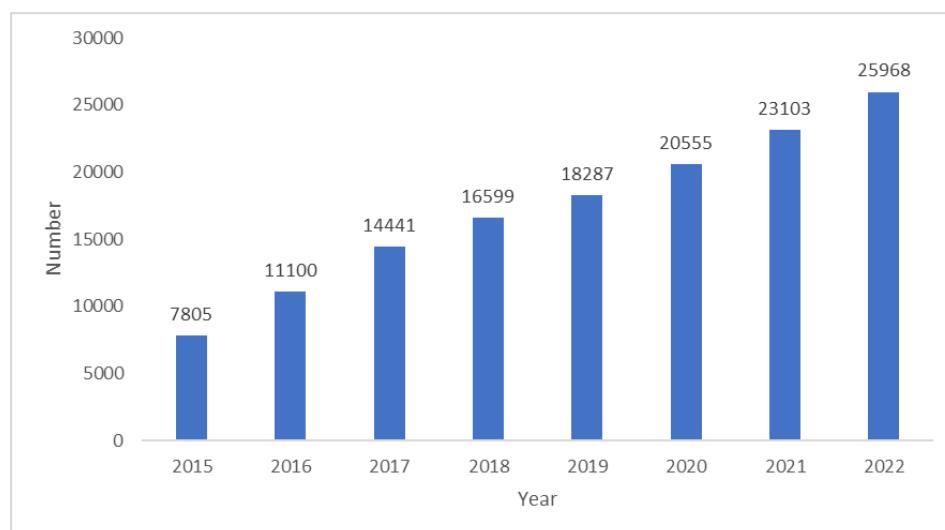
1 Introduction

Generally, if someone were to put it in simple terms, commercial or office park constitutes a spacious area comprised of a large number of office buildings (Cybriwski 1999). The companies that occupy the offices in a typical business centres and office parks are usually trading companies, not industrial companies. Business parks and office centres are popular in suburbs, where land is much cheaper than in urban areas. Office parks became popular in the recent years with the shift in the economies of the developed Western countries from industrial production to services (such as commercial, financial, digital, etc.) (Barnett 2017). Moreover, the globalisation and digitalisation of the economy enabled companies to provide their services on the global scale using Internet and information communication technologies (ICTs). Physical personal contact with the customer is no longer needed and all communication can be conducted via telephone or Internet (Richter et al. 2017).

When people think of different types of commercial real estate, they usually think of shopping malls, office buildings or warehouses at a high level. In the commercial real estate industry, however, the definition of real estate types is far more precise (Holland et al. 2000). There are different types of commercial property with the typical definition of each category. A facility for converting raw food and meat products into packaged products for institutional or retail use. Food processing equipment usually includes many special design features to meet the requirements of the health code of a respective country. An essential part of these facilities includes large cooling chambers to minimize bacterial growth and extend the life of perishable food products. Office space is ideal for businesses that need space for offices, cabins, a lobby, public toilets, and other facilities such as comfortable lounges, cafes, and perhaps spaces for relaxation or even a short nap.

When a company or a sole trader typically chooses an office, they do so because of its proximity to the source of the Internet (which is very relevant in case of high-frequency trading), for being close to the place of residence or major clients, the occurrence of many restaurants nearby or for being close to the motorway or the nearest airport. In short, the reasons might be plenty. One important issue that emerged in the last decade is coworking when people or companies do not rent the whole offices but desks or cubicles at the office space (see e.g. Spinuzzi 2012). Figure 1 that follows shows the dynamics of growth in the number of coworking centres worldwide. It is apparent that their popularity is on the rise and their numbers are growing with an unprecedented pace.

Figure 1. Number of coworking centres worldwide



Source: Coworkingsources (2019)

In addition, some companies may consider renting office space instead of retail space due to the money factor. Most parts of a city have public transport to the city centre but not to commercial areas. In other words, to get to the business parks, one has to either drive or take a taxi. If one arrives by public transport, she or he may need to change several times. In the United States, neighbourhood centres reflect a convenience concept and typically cover 30,000 to 150,000 square feet of glass, including anchors, on three to five acres. They usually have one or more anchors (supermarket) with an anchor ratio of 30 to 50 percent and a primary trading area of three miles. Outlet Centres conform to the concept of a manufacturer's outlet store and typically include 50,000 to 400,000 square feet of gross leasable areas (GLA), including ancho on 10 to 50 acres (Pitt and Musa 2009).

Our paper aims at explaining today's leading approaches to planning and construction of modern business parks and office centres. We concentrate on such issues as the feature of modern business centres in modern architecture, energy efficiency and sustainability of office buildings and business parks, or town-planning features of modern office buildings. We bring many examples from different countries and various parts of the world to show the unifying trend and the similarities for the business parks regardless of their geographical location.

2 Features of business centres in modern architecture

Nowadays, business parks and office centres are no longer grim and grey places designed for work and work alone. Modern companies want their employees to feel at home and therefore attempt to create an appealing workspace. The best example is Google headquarters in Silicon Valley, at Mountain View (called "Googleplex") which boasts unique and bold architectural solutions, gourmet restaurants with free food from all over the world, basketball fields, sunbeds, and much more (Ferguson 2005).

Modern architecture is becoming a masterpiece in itself. Some works or collections of modern architecture have been declared a UNESCO World Heritage Site. In addition to the early Art Nouveau experiments, these are some of the buildings that represent the gems of the office architecture: the Rietveld Schroder House in Utrecht, the Bauhaus buildings in Weimar and Dessau, the Berlin Modern Settlements, the White City of Tel Aviv, the city of Asmara, the city of Brasilia, the Ciudad Universitaria of UNAM in Mexico City and the university city of Caracas in Venezuela, as well as the Sydney Opera House (Jokilehto 2006; Davis 2013). Private organizations such as Docomomo International, the World Monuments Fund, and the Recent Past Preservation Network are

working to protect and document endangered modern architecture. In 2006, the World Monuments Fund launched the program Modernism at Risk, a program for advocacy and conservation (Frey and Steiner 2011).

Modern architecture is generally characterized by a simplification of form and the creation of ornaments from the structure and theme of the building. It is a term that is applied to a transversal movement whose exact definition and scope vary widely. More broadly, early modern architecture began at the turn of the twentieth century in an effort to reconcile the principles underlying architectural design with rapid technological advances and the modernization of society. These were numerous movements, design schools and architectural styles, some of which were tense and often opposed classification equally. Such industrial monuments are not only the subject of cultural clashes, but also controversial in terms of planning for their conservation, urban development, and architectural production. Historic sites, their architecture and machinery are a testimony to the past and are resources for urban development. In this constellation, a series of conflicts results from the different values of the individual discourses. The integration of urban planning into the preservation of a listed area is a major task of conservation. Urban planning provides a new future for the city and region to adapt to new challenges and enhance the prosperity and quality of the urban environment for all. However, because industrial heritage monuments are located in cities, they are part of urban redevelopment and urban development planning.

Architectural and planning practices show that historic industrial complexes consist of urban spatial structures that can be preserved and upgraded as new uses are made. Conversions are often related to the local environment and can combine several new features. The alterations are based on various examples of urban block use and transform the former mill into various types of urban space. Another type covers complexes with an additive urban structure, which is usually characterized by rows or lattices. As an example, a site called Park 258 which served as a light industrial textile mill in the 1980s and is located in the geographic and economic centre of western Quzhou, China. It was redesigned by an Italian company recently to become a landmark and a prominent office centre hub (Landezine 2019).

With the creative idea of exchange and filling, modern developers are opening some of the huge closed factories moderately and gradually adding new buildings as public art spaces. They do not intend to define clear boundaries, but seek to create a dynamic, interactive and flexible framework to continually adapt to the new needs of the city. In the vast spaces of Eastern Europe, new patterns could be drawn on a clean sheet of paper, the open landscape. An interesting concept is the garden city that should be a bicycle with the station and the industrial quarter as the outer edge, mediator between city and country (Sharifi 2016). The shoe and marmalade factories, the bicycles, clothing, furniture and printing and machinery manufacturing plants neatly embraced the city before it dissolved into the pleasant green of small farms and dairy cattle ranches. To illustrate his ideas, in the 1920s a series of houses and villas were built in and around Paris. They were always white and had no ornamentation or ornament on the outside or inside. An elegant white box wrapped in a band of stained-glass windows on the front. The living space, opening onto a garden and countryside, became an icon of modernist architecture from a series of white pylons in the middle of a large lawn. He was an advocate of standardization in the architecture and mass-production of rationally designed blocks of flats for factory workers. While Gropius was working at the Bauhaus, Ludwig Mies van der Rohe led the modernist architectural movement in Berlin. Inspired by the De Stijl movement in the Netherlands, he built congregations of concrete summer houses and proposed a project for a glass office tower.

Hence, it becomes clear that modern office architecture draws from the creative ideas of the previously popular architectural styles and concepts. In addition, it adds functionality and modernity to the existing patterns making today's business centres some true masterpieces that would be admired many years after their construction is completed and approved.

3 Energy efficiency of modern office buildings

Energy efficiency is a very important aspect of modern buildings. The measures for building comfort, lighting, heating, and cooling consume large amounts of energy (Bodart and De Herde 2002). Electricity and natural gas are the most common sources of energy for commercial buildings. However, there are remote energy systems that provide groups of business buildings with heat and cold. If many buildings are close to each other, for example, on a college campus or in a city, it is sometimes more efficient to have a centralized heating and cooling system that distributes steam, hot water, or chilled water to multiple buildings (Gang et al. 2016). In addition, many modern office buildings are now implementing the features of smart homes (i.e. intelligent households equipped with all kinds of smart meters and devices connected to the Internet and enabling the two-way communication of data and commands). This trend goes hand in hand with the implementation of smart grids and autonomic energy systems (Strielkowski 2017).

Another issue of energy efficiency is using renewable energy sources (RES) for powering modern office buildings. The philosophy of modern business parks is being sustainable and energy self-sufficient which is in accord with the new renewables market strategies that are becoming a norm not only in Europe but also all around the world (Newbery et al. 2018). For that purpose, many business parks employ RES for generating their electricity

and heating. Most of it is represented by the photovoltaic systems. Photovoltaic systems are an aggregation of components that generate electrical energy from solar radiation collectors and utilize them. In addition,

A comparative study between 2 green buildings and 2 residents of conventional buildings (total of 270 respondents) conducted in New Zealand showed that the residents' complaints to the building manager Green buildings designed to be energy efficient (a Green Star New Zealand certification), including energy-efficient features such as high-glazed windows, layered facades or occupancy sensors. Green Building users complain to the Facility Manager less than conventional buildings (Azizi et al. 2015).

There are some studies attempting to show whether the energy consumption and CO₂ emissions are related to the satisfaction and comfort of dwellers (Tan et al. 2018). The results showed that increased energy consumption in the case study buildings was associated with reduced occupant control and this was associated with reduced comfort and reduced patient satisfaction. The inhabitants of green buildings were satisfied with the room temperature, the air quality, the light and noise conditions as well as the personal work area. Female users were significantly less satisfied with perceived temperature conditions than male users. The majority of residents were dissatisfied with the thermal comfort and light conditions of the buildings, even though these buildings were certified with sustainable building assessment tools.

Moreover, Lawrence and Keime (2016) conduct review after occupancy in two green buildings and state that there was no difference in satisfaction with the acoustic environment in both building types. Satisfaction with building technology is much higher in the green office building than in the traditional office building. Moreover, Steemers and Manchanda (2010) carried out the surveillance and survey of twelve office buildings in the United Kingdom and India (conducted in a form of a correlation study). It appears that strategies to reduce thermal costs include the careful planning and design of new heating or cooling systems, the reduction of heat losses through improved thermal insulation, or the change in internal temperature. In addition, there appear to be two main types of studies in the literature on sustainable temperature solutions. On the one hand, there are studies focusing on the implications of implementing local devices (e.g. chairs, desks, or ceiling panels) aimed at improving thermal comfort. On the other hand, there is research focused on global thermal solutions in office buildings, including solutions for ventilation, cooling and air conditioning.

4 Town-planning features of modern office buildings

The natural environment of the site, its contours and vegetation are assets that must be preserved and incorporated into the design as much as possible. In the United States, for all environments with historic buildings, adjacent historical buildings, or near historic buildings that are affected by the US General Service Administration (GSA) establishment, an external design review, including public participation, is required as demanded by the Section 106 of the National Historic Preservation Act that is embedded in the National Environmental Law (Avrami 2016).

Compliance reviews should be coordinated by the Regional Historic Preservation Officer early and as often as the complexity of the project requires, so that comments can be effectively taken into account throughout the design process. The local topography, the water and the peculiarities of the landscape and the cultural heritage should be included as far as possible in the planning. The project has been successful in generating much economic value through conservation efforts, which has led to an increase in the land prices of neighbouring areas. In fact, the developer admits that the project of preservation without high returns from adjacent developments would have been financially unattainable. The quality of these buildings in terms of architectural design and materials was considered one of the weaknesses of the resettlement program. Residents also criticized the uncomfortable contrast of the tall tower buildings with the existing historic city centre and the fact that the new towers are not well integrated into the traditional neighbourhoods.

All of these problems could have been addressed early on as part of the overall plan. Concentrating a large number of workers in a building can have a significant impact on the neighbourhoods. Office structures can strengthen neighbourhoods with retail, food service, and related business relationships that connect the office to the neighbourhood. When developing office structures, traffic issues must also be considered. Office buildings are often affected by urban planning and urban zones designed to promote compatible land use and living neighbourhoods. Architecture and urban planning are related endeavours that focus on different geographic scales. The architecture works on a scale of the individual building and the immediate area, while planning is done on a scale of neighbourhoods, communities and regions. In addition, planning has developed many specializations that focus on various aspects of the larger built-up environment, such as: affordable housing, transport, economic development, protection of natural resources, land use planning and community development.

The most important consideration when designing outdoor and public spaces is the potential future use of these spaces. The team should discuss with potential users how they would like to use the space to include appropriate amenities, tune outside areas to indoor areas (e.g. restaurants), to accommodate traffic to and from the building, and to schedule periodically scheduled departure. Use of the rooms and special events. Various areas of public space should be considered which would be suitable for various types and intensities of public activity. Potential users of the room include not only the tenants of the buildings, but also people in neighbouring properties,

as well as organizations, such as performing arts or sales organizations, who could assist the GSA in arranging activities in the space. For planning purposes, GSA translates the Agency's space requirements, expressed as floor space, into gross floor space using building efficiency factors. For the rental cost, GSA converts agency space requirements, expressed as floor space, into a rental space using specific metrics for each building. The agencies identify the amount of usable space they need within a building for the GSA and request that space on a standard form. The type of building usage determines the likely number of stops used in the traffic analysis calculations.

It can be also shown on the example of United States that the estimated lift population is calculated on the basis of the usable area of the building and a factor of 14 m² per person. It is estimated that 8 to 10 percent of the population do not need a lift during peak hours. If the building design requires two or more elevators, the results of the population calculation are broken down according to the functional design of the building. Therefore, applicable rules and regulations should be taken into account to shape up the resulting project of the office buildings in office centres and business parks. This US experience is, of course, transferable to the other countries and regions and constitutes a good basis for learning and adapting the new approaches in modern office architecture.

5 Conclusions and discussions

All in all, it becomes apparent that modern business centres worldwide became a product of recent economic and business development of the globalised and computerised economy of the hectic 21st century. Planning, preparing logistics and eventual construction of modern office buildings requires obeying the new rules and norms that impose such issues as energy efficiency of self-reliance that were not in existence or were not known before.

One might ask a question: why do we need any office building and office parks in the 21st century when everyone can work from home as in the "home office" mode? The answer is obvious: there is still a need for socialising and networking and many people are not capable of working from home. Hence, the idea of coworking might be an appealing solution for these individuals. In addition, quite often it takes a group discussion or a meeting to spark some creative ideas. Humans are social beings and the idea of aggregating in common spaces from time to time might help to increase business productivity.

Overall, business centres of the 21st century need to take into account all the features and trends of modern times. They need to be flexible and offer multi-purpose usage for various groups of people, both permanent office workers and global nomads who might be visiting group meeting from time to time. In addition, they need to fulfil the requirements of low emission, sustainable operation, and, if possible, green energy implementation (with peer-to-peer energy market elements). The new challenges such as electric vehicles or 5G Internet would impose more requirements and tasks that need to be foreseen and prepared for in advance.

References

- Avrami E (2016) Making historic preservation sustainable. *Journal of the American Planning Association* 82(2):104-112. doi: 10.1080/01944363.2015.1126196
- Azizi NSM, Wilkinson S, Fassman E (2015) An analysis of occupants response to thermal discomfort in green and conventional buildings in New Zealand. *Energy and Buildings* 104:191-198. doi: 10.1016/j.enbuild.2015.07.012
- Barnett J, Redesigning cities: Principles, practice, implementation, 1st edn. (Routledge, London, 2017), 312 p.
- Bodart M, De Herde A (2002) Global energy savings in offices buildings by the use of daylighting. *Energy and buildings* 34(5):421-429. doi: 10.1016/S0378-7788(01)00117-7
- Coworkingsources (2019) Global coworking study 2019. <https://www.coworkingresources.org/blog/key-figures-coworking-growth>. Accessed 12 August 2019
- Cybriwsky R (1999) Changing patterns of urban public space: observations and assessments from the Tokyo and New York metropolitan areas. *Cities* 16(4):223-231. doi: 10.1016/S0264-2751(99)00021-9
- Davis DE (2013) Zero-tolerance policing, stealth real estate development, and the transformation of public space: Evidence from Mexico City. *Latin American Perspectives* 40(2):53-76. doi: 10.1177/0094582X12467761
- Ferguson CH (2005) What's next for Google. *Technology Review* 108(1):38-46
- Frey BS, Steiner L (2011) World Heritage List: does it make sense? *International Journal of Cultural Policy* 17(5):555-573. doi: 10.1080/10286632.2010.541906

- Gang W, Wang S, Xiao F, Gao DC (2016) District cooling systems: Technology integration, system optimization, challenges and opportunities for applications. *Renewable and Sustainable Energy Reviews* 53:253-264. doi: 10.1016/j.rser.2015.08.051
- Holland AS, Ott SH, Riddiough TJ (2000) The role of uncertainty in investment: An examination of competing investment models using commercial real estate data. *Real Estate Economics* 28(1):33-64. doi: 10.1111/1540-6229.00792
- Jokilehto J (2006) Modern built heritage as world heritage. https://www.icomos.org/risk/2007/pdf/Soviet_Heritage_10_I-4_Jokilehto.pdf. Accessed 20 August 2019
- Landezine (2019) Quzhou Park 25. <http://www.landezine.com/index.php/2018/04/metrostudio>. Accessed on 19 August 2019
- Lawrence R, Keime C (2016) Bridging the gap between energy and comfort: Post-occupancy evaluation of two higher-education buildings in Sheffield. *Energy and Buildings* 130:651-666. doi: 10.1016/j.enbuild.2016.09.001
- Newbery D, Pollitt MG, Ritz RA, Strielkowski W (2018) Market design for a high-renewables European electricity system. *Renewable and Sustainable Energy Reviews* 91:695-707. doi: 10.1016/j.rser.2018.04.025
- Pitt M, Musa ZN (2009) Towards defining shopping centres and their management systems. *Journal of Retail & Leisure Property* 8(1):39-55. doi: 10.1057/rlp.2008.25
- Richter C, Kraus S, Brem A, Durst S, Giselbrecht C (2017) Digital entrepreneurship: Innovative business models for the sharing economy. *Creativity and Innovation Management* 26(3):300-310. doi: 10.1111/caim.12227
- Sharifi A (2016) From Garden City to Eco-urbanism: The quest for sustainable neighborhood development. *Sustainable Cities and Society* 20:1-16. doi: 10.1016/j.scs.2015.09.002
- Spinuzzi C (2012) Working alone together: Coworking as emergent collaborative activity. *Journal of Business and Technical Communication* 26(4):399-441. doi: 10.1177/1050651912444070
- Steemers K, Manchanda S (2010) Energy efficient design and occupant well-being: Case studies in the UK and India. *Building and environment* 45(2):270-278. doi: 10.1016/j.buildenv.2009.08.025
- Strielkowski W (2017) Social and Economic Implications for the Smart Grids of the Future. *Economics and Sociology* 10(1):310-318. doi: 10.14254/2071-789X.2017/10-1/22
- Tan Y, Liu G, Zhang Y, Shuai C, Shen GQ (2018) Green retrofit of aged residential buildings in Hong Kong: A preliminary study. *Building and Environment* 143:89-98. doi: 10.1016/j.buildenv.2018.06.058