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UNIVERSITY SPACE MANAGEMENT EXEMPLIFIED BY SELECTED EUROPEAN ENTITIES

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Abstract

The rapid changes taking place in the environment of academic institutions (market rules in tertiary education, the greater availability of university education, globalization and internationalization, emergence of knowledge-based societies) force them to adjust to the new environment and to adopt a new approach to management, (FRIGA, BERRIS, SULLIVAN 2003; JAJSZCZYK 2009; CLARYSSE, MOSEY, LAMBRECHT 2009; LAW, HO 2009; AMTHOR, METZGER 2011; LEJA 2013), as well as to competition and value creation.

Due to the pressure of their environment, universities have to be more efficient, functional and effective (ANTONOWICZ 2005; ROBBINS 2008). They are increasingly more and more often expected to be more effective in their work, open to the outside world, and more entrepreneurial (KEAST 1995; ETZKOVITZ, WEBSTER 2000; ETZKOVITZ 2004; KIRBY 2006). Without meeting these expectations, success on the market cannot be achieved.

In many renowned European universities, the strategic role of real estate as an asset creating the value of the entity has long been emphasized. This means that the effective use of space and implementation of a rational space management policy enable the entity to enhance its value and affect its economic condition (WOLSKI, ZAŁĘCZNA 2011; KONOWALCZUK, RAMIAN 2012). The existing space management expertise of foreign universities makes it possible to implement this knowledge in the process of university management in Poland. The basic goal of this paper is to present the nature of the space management process, as well as chief indicators that are used in selected European universities to assess the degree of estate utilization. In other words, space management solutions used outside of Poland will be sought, which can help to resolve the problems of many Polish tertiary institutions.

Key words: *space management, higher education institutions.*

JEL Classification: R30, D03, D70.

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1. Introduction

In recent years, higher education in Poland has been struggling with serious problems. The population decline is reflected in the falling numbers of undergraduates observed each year in many universities and colleges, as well as by the intensifying competition between them. There were 460 higher education establishments in Poland in 2012 – more than any other European country.

The falling number of undergraduates translates into lower revenues from both tuition fees and state subsidies. At the same time, the cost of labor, as well as operation and maintenance expenses continue to grow. Furthermore, the availability of EU funding has prompted many establishments to invest in new buildings and other infrastructure. Due to the falling number of students, they are often used much below their capacity, deteriorating the financial standing of many entities even further.

Outside of Poland, the fact that real estate is not only a cost-intensive asset, with an impact on the owner's economics (its running costs, on the average, account for approximately 20 percent of the operating costs of a university), but also a strategic one is stressed (TEFMA 2009). It is the foundation on which all the activities are based, and the achievement of the pre-defined educational and research objectives depends on the structure of real estate and its use, as well as on the degree in which it is adjusted to the actual needs (AHMAD FAUZI 2005). University estate management is the subject of numerous conferences and publications by local authorities and associations (the Higher Education Funding Council for England (HEFCE), the Association of University Directors of Estates (AUDE) and the Higher Education Statistics Agency (HESA) in Britain, the Association of Higher Education Facilities Officers (APPA) in Australia and the USA). According to a HEFCE report, more than 60 percent of British academic institutions were already practicing space management in 2005, while nearly eighty percent gathered data to determine their space utilization levels (SMG 2005, p. 4).

In Poland, however, the issue continues to receive marginal interest. Publications of the Central Statistical Office (GUS) or of the Ministry of Science and Higher Education do not cover real estate, its size, composition, or utilization. An attempt must, therefore, be made to identify the possibility of implementing space management knowledge, so amply presented in international literature on the subject (LUTCHMAN 2006; VAN DER LEI, HERDER ET AL. 2012), into the management processes at Polish universities.

The purpose of this paper is to present the essence of the space management process, together with the main indicators used in selected European universities to assess their space utilization levels. The universities were not selected randomly, as it was the author's intention to highlight a whole range of issues related to space management, including those connected with the type of higher education establishment, its location, the real estate owned and its state of repair.

In the pursuit of this goal, both secondary sources were used (such as books, estate policy documents and reports on university real assets), as well as information obtained empirically in the course of a case study conducted in December 2013 from the people in charge of the Vienna University of Economics and Business (WU) campus.

2. Space management – objectives and constituents

Many definitions of space management can be found in literature on the subject. According to Newcastle University (2007), space management can be defined as the ability to allocate space to a specific user and/or for a specific use. Abdullah, Ali and Sipan (2012) point out that space management is more than its mere allocation to users, and the assessment of needs in this respect. The process is to secure measurable gains, both financial (AHMADFAUZI A. WAHAB 2000) and non-financial (e.g., related to the work effectiveness of both students and staff), for the university. Its main objective is the efficient and productive use of the space and equipment owned by the university at present as well as in the future. Academic institutions should attempt to maximize the use of their estate while securing a friendly work environment. The design of teaching and research spaces should ensure their functionality, as well as the possibility to accommodate the changing needs of the university. Meanwhile, the Tertiary Education Facilities Management Association (TEFMA) highlights the use of standards, benchmarks and various types of models as inherent in space management. These should be used to measure the effectiveness of space use and then to plan and adjust the space to future needs. This ensures a reduction of investment expenses and operating costs, while allowing as much/little space as the university actually needs to be maintained (TEFMA, 2009).

As an element of real estate policy, space management determines the long-term decisions of the university (including its financial and development strategies) regarding the acquisition or construction of new facilities, the refurbishment or more intensive use of existing buildings, or the disposal of real estate that is not in use (Figure 1). It should, as a consequence, cause the real property of the university to be adjusted to its needs as closely as possible, thus ensuring its proper operation and the achievement of long-term educational and research objectives (KEISER 1989; DICKESON 1999; JONES, WHITE 2008).

The space management process should include:

1) keeping a regularly updated estate inventory;
2) measurement of space utilization;
3) space allocation and space requirement planning.

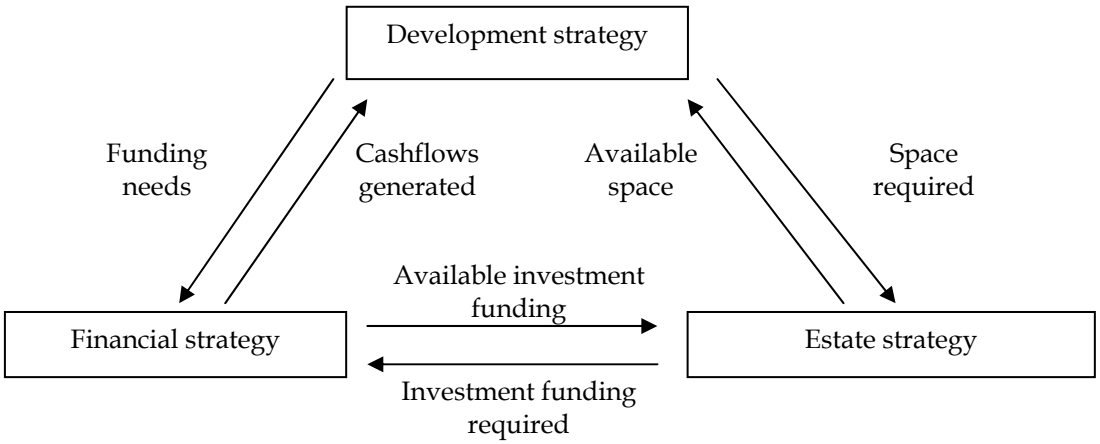


Fig. 1. Space management as a determinant of strategic decisions of universities. *Source:* Rymarzak (2000).

Keeping a regularly updated space inventory means all the activities performed in order to list in detail its size (number of square meters) and profile (location, function, age, and state of repair). A number of measurement standards are used throughout the world. Space measurement in British universities is most commonly based on the method proposed by the Royal Institute of Chartered Surveyors (RICS) in the "*Code of Measuring Practice: A Guide for Property Professionals*" (RICS 2007), which is used for public reporting and statistics. The Higher Education Statistics Agency (HESA) obliges universities to measure so-called *Gross Internal Area (*GIA) and *Net Internal Area (*NIA) and classify the space concerned as *commercial*, *residential,* or *non-residential*. Table 1 shows the proportion of various space categories in non-residential NIA of 70 universities surveyed by the HEFCE in the academic year 2007/2008.

Table 1

Average proportion of various space categories in non-residential NIA of universities

Space category	Average proportion of the space category in non-residential NIA of universities (percent)
academic space	42.2
office space	26.0
catering	3.5
learning resource centre	9.0
other support space	16.4
vacant space	1.7
other space	5.3

Source: HEFCE 2010, *Performance in higher education estates. EMS Annual Report 2009*, p. 17.

British universities are also obliged to provide information on the age and technical condition of their buildings. In space allocation plans, buildings are grouped according to their construction date: before 1840, 1840-1914, 1915-1939, 1940-1959, 1960-1979, 1980-1999, 2000 and later, and classified according to their state of repair; Class A means a new building; class B means a building that is safe to operate, albeit with some minor faults; class C means one that can be operated, but requiring some essential repairs to be made within a short-to-medium term perspective; class D stands for a building that is unfit for use or poses a serious threat of a major breakdown.

Space measurement of university buildings in Austria, the Netherlands or Finland, is performed differently. While Austrian universities calculate *Net Floor Area* (NFA), the Finnish establish *Gross Floor Area* (GFA) and *Net Usable Area* (NUA), and in Dutch academic institutions, it is GFA and *Usable Floor Area* (UFA) that are examined; the latter is identified with NUA (RYTKÖNEN 2012) and according to Dutch standards, it can be used for *office*, *residential*, *education*, *restaurant*, *support*, *specific (including laboratories)*, *special storage*, *storage,* or *sanitary* functions (DEN HEIJER 2011).

Space utilization measurement means the monitoring and evaluation of how and to what extent the buildings are actually used, as well as what costs and problems are connected with the space

operated in individual buildings and locations. Essentially, space utilization depends, on the one hand, on the total area of available space, and on the other, on the number of users (including staff and students of all types of courses and levels) and the number of hours during which the space is used (SMG 2006). Measuring space utilization is important not only where optimizing its use is concerned, but in terms of the costs of running the building. This is due to the fact that space operating costs rise as utilization increases and, as pointed out by Lawrence (1989) and Williams (1994), space is the catalyst for other cost items, like the costs of cleaning, maintenance and repairs, labor, etc.

Keeping estate inventory and space utilization measurement are the basis upon which space can be arranged, rearranged and allocated. Furthermore, by considering its development plans and the estimated number of students of all course types and levels (DU VALL 2011), the university may determine how much space it needs to meet its teaching and research goals in the coming years.

3. Indicators used in space management of selected higher education institutions

A number of various indicators can be used in the process of university space management. However, in order to find out if university space is used efficiently, to identify areas that require some improvement, and to make plans for the future, the values of indicators must be compared with existing standards or values achieved in contending universities (TEFMA 2009).

The indicators most frequently used in university space management include (SMG 2005):

1) NIA/GIA or GFA/UFA ratios, which are the proportion of net internal area to gross internal area or of gross floor area to usable floor area, respectively. An NIA/GIA ratio of more than 85% indicates that the space is used efficiently.
2) The ratios between non-residential GIA, GFA, NIA or NUA and the number of students or staff members, which make it possible to calculate the number of square meters per 1 student or staff member, and to determine the minimum space required for the performance of certain academic and/or administrative tasks. In Britain, the average amount of non-residential GIA per one student in 2010 was 8.8 m² (HEFCE 2011), with the highest values reaching 17.2 m². However, according to the Association of University Directors of Estates (AUDE), the demand for space should result from the specific nature of the activities conducted by a given institution. In universities where income from research accounts for less than 20% of total income, NIA per one student or full-time staff member should not exceed an average of 4.9 m². On the other hand, at universities where research income exceeds 20%, NIA should amount to an average of about 9.0 m² (AUDE 2013).
   It ought to be added here that in-depth analyses should be made in regard to academic resource centers and other support spaces per one student. On the other hand, as far as staff is concerned, office and administration space per staff member should be calculated. The values of the individual ratios are shown in Table 2.
3) Frequency rate (FR) is the ratio between the number of hours during which the space was actually used and the number of hours the space could have been used. The ratio is usually calculated on a weekly, monthly, or annual basis. It is assumed that the optimum frequency rate should be higher than 75%. In Britain, the indicator was 54% on average in 2003-2004 (SMG 2006b).
4) The frequency booked (FB) indicator is calculated as the ratio between the number of actually booked hours and the hours that could have been booked.
5) Occupancy rate (OR or OCC) is the ratio of the number of students who actually stayed in a given room during the examined period to the maximum number of students a given room can accommodate, and to the number of hours the room was occupied. The ratio can be calculated on a weekly, monthly, or annual basis. For British universities in 2003-2004, the indicator was 49% (SMG 2006b).
6) Space utilization rate (UR) is the product of frequency rate (FR) and occupancy rate (OR). It gives an idea to what degree a given space is utilized. Space utilization is considered good when the indicator exceeds 35%, fair at 25-35% and poor if it falls below 25% (NAO, 1996).

What can also be analyzed is space that was booked but eventually not used, or space that was not booked but used in the academic process.

Table 2

Sample indicator values used in university space management

Indicator	Indicator value
NIA per workplace:	
- lecture halls	1m²
- seminar rooms	2.25m²
- tutorial rooms	2.25m²
- computer labs	2.75m²
Office NIA per one academic or administrative staff member:	
- large office with meeting space	15m²
- single office	9m²
- shared offices	7.5m²/person
- meeting rooms	2m²

Source: AUDE 2010, *Space Assessment Models (SAMs) and Space Profiles*, p. 5.

Table 3 presents the indicator values for selected European universities.

Table 3

Indicator values used in space management of selected European universities

Indicator	Vienna University of Economics and Business (WU)	Delft University of Technology	Aalto University	University of Sheffield	Durham University
NIA/GIA	65.8%	No data	No data	94.3%	75.3%
UFA/GFA	No data	63.5%	58.4%	No data	No data
***GIA* or *GFA* / number of students**	6.42m² *GIA*/pers.	31.35m² *GFA*/pers.	22.55m² *GFA*/pers.	16.63m² *GIA*/pers.	11.32m² *GIA*/pers.
***NIA* or *NUA* / number of students**	3.97m² *NIA*/pers.	No data	5.6m² *NUA*/pers.	18.02m² *NIA*/pers.	18.76m² *NIA*/pers.
***GIA* or *GFA* / number of staff**	139.89m² *GIA*/pers.	151.44m² *GFA*/pers.	93.92m² *GFA*/pers.	69.27m² *GIA*/pers.	47.68m² *GIA*/pers.
Frequency rate	70%	30%	No data	56%	61%
Occupancy rate	No data	No data	No data	27%	41%
Utilization rate	No data	No data	No data	26%	25%

Source: Rymarzak based on: DURHAM UNIVERSITY 2013; UNIVERSITY OF SHEFFIELD 2012; DEN HEIJER 2011; DELFT UNIVERSITY OF TECHNOLOGY; RYTKÖNEN 2012; unpublished materials of WU.

Data for the calculation of indicators were obtained from personal interviews, websites, estate strategies of individual universities, and books. The universities were selected by purposive sampling, as it was the author's intention to flag a number of space management problems, including those resulting from the type of university (economic – Vienna University of Economics and Business, technological – Delft University of Technology, general – Aalto University, University of Sheffield, Durham University), its location (Austria - WU, the Netherlands – Delft University of Technology, Finland – Aalto University, the UK - University of Sheffield, Durham University), the estate owned

and its technical condition (e.g., WU – one modern campus completed in 2013, Delft University of Technology – 80% of the space in buildings completed in the 1950s-1970s, Durham University – 17% of real estate more than 150 years old). Another reason for using purposive sampling was the availability of detailed information about these universities.

The above indicators show that the relatively smallest percentage of "dead" space was at the University of Sheffield, and the largest at the Vienna University of Economics and Business (WU). The NIA to GIA ratio at these universities was 94.3% and 65.8%, respectively. A similarly interpretable UFA/GFA ratio was found to be 63.5% at the Delft University of Technology and 58.3% at Aalto University.

The Austrian university had the lowest non-residential GIA and NIA per one student (6.42m^2 and 3.97m^2, respectively), while GFA was the lowest at the Finnish university (22.55m^2). As regards GIA or GFA per staff member, the situation looked different. The value of this indicator was relatively the lowest at Durham University (47.68m^2 GIA) and Aalto University (93.92m^2 GFA). It should be added here that a more detailed examination of the Finnish university reveals an NUA per staff member ratio of 23.3m^2.

The calculation of another group of indicators concerning the degree of space utilization is obligatory for British universities only. Every year, these universities are obliged to provide indicators of frequency rate, occupancy rate, and utilization rate. During the studied period, the respective values amounted to 57%, 27% and 26% at the University of Sheffield, and 61%, 41% and 25% at Durham University.

As for the Dutch and Austrian universities, the reason why the average frequency rate values are rarely calculated or published is that their levels varied dramatically at different periods of time. According to Den Heijer, space occupancy at Dutch universities is the highest on Fridays, when classes are conducted by part-time lecturers. Moreover, the rate is relatively high during both semesters (classes are held for 28 weeks a year), but low during the holiday season and examination sessions. The average value of this indicator for most Dutch universities is slightly over 30% (DEN HEIJER 2011), so it can be stated that it is relatively low when compared with other universities (British or Austrian – 70%). Low values of this indicator result from the lack of part-time students on the one hand, and the specific character of academic work on the other (DEN HEIJER 2011). Some staff members work from home, have part-time jobs, or go away on business trips (attending conferences, seminars or training courses).

4. Conclusions

In the author's opinion, the conducted research concerns an issue of importance, though not much recognized in Poland. Space management is a multidirectional and difficult area. This mainly results from:

1) the size of space, its different functions and the changes they undergo, both quantitative and qualitative;
2) the necessity to flexibly adjust the size and structure of university estates to changing conditions that include falling numbers of undergraduates and a shift to more research-oriented institutions;
3) decreasing government subsidies for education and growing costs of estate operation and maintenance, which makes it necessary for universities to use their assets more intensively.

On the one hand, inadequately used or unused space is a source of costs; on the other, the university should consider possible ways of making its space an additional source of income. More efficient space utilization may contribute to cost reduction, and the money currently spent on the maintenance of unused space could be earmarked for the accomplishment of the entity's statutory objectives. Therefore, it is necessary to seek efficient ways of managing this complex category, which has an impact not only on the operation of universities, but on their financial results as well.

The research has shown the UK to be a leader in university space management. For many years, space management has been obligatory for British universities, which includes annual reporting on the quantity and quality of their assets and their utilization. As far as the other universities are concerned, the problem of space management is recognized, and space management IT systems are being or have already been implemented in order find solutions to it. The Finnish and Dutch universities apply space measurement standards recommended by the Australasian TEFMA. Instead

of British standards and NIA and GIA calculations, the two universities apply UFA and GFA measurements. At the Austrian university, a unit responsible for space management was being established at the time of the study: the Computer Aided Facilities Management system was being implemented. For the purpose of this paper, British standards were used to calculate the values of individual indicators at WU.

The results of a pilot survey conducted by the author of this paper show that Polish higher education institutions are far behind as regards space management. Quite often, there is no comprehensive estate register, audits to assess the "indispensability" of estate are rarely, if at all, conducted, and there are no benchmarks or consistent monitoring of operational costs. Therefore, the long-standing experience of foreign universities may become a model on the basis of which benchmarks useful to Polish academic institutions can be developed; these should account for such issues as the specific nature of the entity, its type, the conditions in which it operates, as well as its resources.

The author is aware that this study only outlines the examined issues, and research results presented here have allowed for little more than the identification of basic indicators applied in space management at selected foreign universities. We can only hope that the above-presented results of both, the study of relevant literature and of the ensuing research, will contribute to a more thorough recognition of university space management, and constitute a starting point for the discussion of the need for public statistics of university estate in Poland.

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