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Development of settlements and their knowledge centers

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ABSTRACT

University campuses and the surrounding urban environment are an integral part of each other's lives. The subject of this article is the relationship between them, primarily in relation to Pécs and University of Pécs. During the examinations, the network of connections regarding the city, university and its education sites will be visible. As it stands, the education sites of University of Pécs are not yet able to function as campuses. The creation of urban public spaces for the development of campuses is essential, as it can be seen through international examples and design. This may be the result of the numerous reductions and reorganization of educational sites.

KEYWORDS

university development, campus design, design principles, open spaces

1. CITIES IN CITIES

Universities originated in cities, and the fame of ancient seats of learning was synonymous with their urban locations (Fig. 1): Padua, Salamanca, Oxford, Paris, Göttingen, Uppsala, Helsinki, Tartu. Cities and their seats of learning were physically intertwined, whether in the mediaeval colleges and faculties whose front doors opened onto the street, or the post-renaissance universities set in monumental classical edifices that defined urban centrality.

Not till the later nineteenth century did American universities begin to be established in out-of-town parks reminiscent of British boarding schools (Fig. 2). Needing a new word for this phenomenon, its promoters used Latin word for a field: "campus".

In the first part of the XXth century, the innovation quickly caught on. Campus designs offered flexibility for expansion and the emergence of new disciplines, they meshed with twentieth century transport and communications technologies, situated in close relation with the urban fabric (Fig. 3). Soon the word campus had become synonymous with a university itself, whether in or out of town.

It was axiomatic that universities newly formed after 1950 would be allocated open landscaped sites in ex-urban locations. Many existing universities were encouraged to relocate to new campuses (Fig. 4).

And those older civic universities that did not have the option of moving out of town often applied campus-style principles to their sites, turning away from adjacent streets, planting shrubs and trees as buffers to segregate academics from their surroundings, and allocating unbuilt space to parking lots so they could drive straight home to the suburbs at the end of the day.

Speaking of existing universities and university campuses, depending on their history, they have a building stock in the city. The campuses of the 60s and 70s typically formed their own area separate from the city, which in many cases got mixed with the city later.

Fig. 1. Universities originated in the heart of city fabric.
(Source: Péter Paári and János Gyergyák)

Fig. 2. American universities begin to be established in out-of-town parks reminiscent of British boarding schools.
(Source: Péter Paári and János Gyergyák)

2. ESTABLISHMENT OF UNIVERSITY OF PÉCS

Considering old-fashioned campuses, buildings are scattered throughout the city, embedded in the fabric of the city. In the case of University of Pécs (UP), there are no “classical” starting campus appearances. Classical campuses in this case are examples of university campuses on which building-oriented design principles are applied, where buildings prevail with the simplicity of their exterior [1]. Outside areas are no more than grassy parks that serve as a foreground of buildings. In its actual form, it does not meet the requirements of a campus (its original meaning is a city belonging to the university, namely an area where university buildings are separate from the rest of the city). This is what later developed a second meaning, which is a community of higher education (students and teachers) with a unique and mixed nature. Known in its present form, University of Pécs

Fig. 3. Campus location in close connection with the newly developed urban fabric.
(Source: Péter Paári and János Gyergyák)

Fig. 4. Relocate the university campus.
(Source: Péter Paári and János Gyergyák)

was established in 2000 by merging Janus Pannonius University, University of Medicine and the Illyés Gyula Teacher Training College in Szekszárd (Fig. 5) [2].

3. TRANSFORMATION OF THE “SITES” TO INTEGRATED “CAMPUS” AREAS IN THE CONTEXT OF UNIVERSITY OF PÉCS

The paper examines the development approaches of the “sites” of University of Pécs from the way transforming them educational, cultural and service hubs: campuses. Currently, in this context, the sites operate as small, introverted elements without having significant connection with the city fabric. Due to the Modern City Program (MCP) opportunity, the current and later, ongoing possibilities - University of Pécs can redefine its future in two scales: the role in the city structure (network) and in site level. This paper covers only the first, the general development approaches of University of Pécs, highlighting the “Western” and “Northern” units. The first one – western unit – takes into account the position and relationships of the Faculty of Science (FS), the Faculty of Humanities (FH), the Faculty of Pharmacy (FP) and the Medical School (MS) meanwhile the

Fig. 5. Overview drawing about the current sites of University of Pécs.
(Source: Péter Paári and János Gyergyák)

other - northern - involves the Faculty of Engineering and Information Technology (FEIT) and International Studies Central (ISC).

The Modern Cities Program was announced by the Hungarian Government at the beginning of 2015, with 23 towns with county rights receiving development grants. The Modern Cities Program contains more than 250 projects worth about Ft 3,500 billion [3]. The developments are implemented partly from domestic sources and partly from EU funds. The development project will last until 2022. The major changes during the MCP take place at the site of the MS, where the original theoretical block is combined together new research and educational functions, and at the same time, a significant part of the building environment is transformed.

The proposed new campus visions - system of educational, cultural, and service hubs - can be realized when the following issues will be fulfilled:

3.1. Intensification the connections of the university areas

When it comes to connections between campuses, two approaches have to be distinguished. One is the system of transport networks for inter-territorial mobility, where attention has to be paid to pedestrian, bicycle, car (and other vehicle) and public transport, while the other is the system of knowledge network linking campuses with training centers [4].

In the first case, it is necessary to look at the urban fabric on a larger scale in order to get an idea of the actual transport network currently under discussion. Currently, the building blocks along structurally important axes are easily accessible, but even at nearby sites, connections are lacking. New connections, primarily pedestrian connections, would be needed to avoid overloading the city with the use of motorized transportation [5].

3.2. Development of the transport network

This approach is about fostering pedestrian, cycling and public transport, solving parking problems: organizing transport hubs (building external and internal networks) where pedestrian, cycling, and public transport takes priority over transport and parking cars.

The cycling network of Pécs is the most active within 5 km of the town center. Regarding this area, it may be a possible alternative to the car. Due to the terrain of Pécs, the east-west and south directions were developed in connection with cycling. However, the height difference between 30 m and 70 m (about 34 m between FEIT and Zsolnay District, while considering one of the highest points between FEIT and Kertváros, the difference is only 3 m, and in order to make the distance between both, nearly 70-m-climb is necessary in a distance of less than 7 m) is a significant obstacle. The city is organizing, among other things, a community cycling system that includes electric bikes, thereby encouraging people to choose cycling. Public transport generally has good hubs, with buses connecting the campus sites with the city. The General Assembly of Pécs decided to develop the East-West bus corridor, thus one of the most decisive processes has started regarding the preference of public transport.

The accessibility and connection of university areas and blocks are greatly influenced by urban transport systems. In this situation, the “cities” of the inward-facing, almost self-governing system are separated from the actual city by a strict, physical boundary. However, current university spaces do not have all the features with which they could sustain themselves, and in many cases they consist of a set of internal and external open spaces that function as local communities, but may have a role of a larger urban or community center. In this case, a one-way connection is established where the university space takes advantage of the city, but its opposite is not rationalized.

The blocks, currently defined as “sites”, are located near the city center within 1.5–2.0 km. The only exception to this is the area of Szántó Kovács János Street on the western edge of the city. The areas within this proximity are suitable for pedestrian and bicycle traffic because of the urban structure. Due to the attractive nature of the city center (a variety of commercial and service functions), it is a popular place since the closeness to the city center and its connection with the central areas are extremely important for university citizens.

3.3. Focusing on the knowledge network

The knowledge network can also be found in different forms as in operation. Cooperation can also be mentioned, which

only manifests in conciliation, since everyone creates their own knowledge at the workplace and puts their knowledge into the project. Another way, for a given period of time, being it short or long term, is that the stakeholders come together and can work together continuously. Finally, a relationship beyond the university system can be declared, where the campus area is transformed into a kind of Science Park where participants come from both the university and private sectors [6].

Its importance is explained by the change in campus image [7]. Over the past decade a conclusion has been formed according to which campuses have to be more than one-function areas for science and education. They are becoming “urbanized”, as well as more is expected from them as a hotspot for innovation and business development. Europe is witnessing a wealth of growing knowledge hotspots: campuses, technology parks, science parks, corporate universities and more. These areas exist for a number of reasons: primarily research and education. At the same time, they are increasingly supporting the growth of technology companies, fostering knowledge transfer between universities and companies to act as seeds for start-ups, stimulating innovation, rebuilding abandoned urban areas, raising a region or city to knowledge economy, attracting foreign investment, maintaining local political discourse, or money for real estate speculation [8]. A study by a university in the Netherlands points to that the educational environments will be one of the most important elements in the global competition for knowledge [9].

The integration of the formerly separate institutions still carries the peculiarity that the university operates in several places considering the structure of the city in a spatially separate manner. The individual units are integrated into their environment within the structure of Pécs, but in each case they tend to operate as a site, forming a closed system. University of Pécs currently has more than 10 locations in the structure regarding the municipality of Pécs with educational, research and health functions. In most cases, sites in their existing environment can be interpreted as “islands”, an element that is not or hardly responsive to the existing environment.

3.4. Open, multi-functional spaces towards the city

In addition, under the title the general approaches are the followings for transforming the operation and space usage of the “sites” to “campus” (defined by analyzing globally recognized campuses):

- Integration with the environment and local communities: conscious integration of the natural environment and related local communities into the operations and functions of the campus;
- Creating green and sustainable buildings and related environments: designing environmentally friendly, nature-oriented and sustainable spaces that, in addition to global trends (energy awareness, nature conservation), provide a pleasant educational environment and serve as a basis for important university research (in-situ research);

- Active student life, “experience-rich” environment: contemporary new campuses aim to improve the quality of student life. In addition to educational functions, interior and exterior spaces are increasingly suggesting mixed functions (campus = open urban space accessible to all, but primarily geared towards student learning and leisure activities [10]);
- Activating spatial connections: eliminating the stark line between exterior and interior (enclosed walls that are less responsive to their surroundings), opening new buildings to their surroundings to create even more attractive and pulsating space with their immediate exterior (instead of hiding, opening);
- Focusing the durability and flexibility of space: rethinking the existing built surfaces and supporting the multifunctional use of design areas.

3.5. Time to act

A research in the United Kingdom, [11] found that one third of the students admitted rejecting a university because of its “poor” built environment. The “poor” design does not refer directly to the buildings, but to the isolated position of the campus or the lack of public spaces. Avoiding a “poor” environment in a city environment is much more complex than Greenfield investments. This is especially true when developing a campus within a dense urban fabric. Compared to the Greenfield situation, the environment is much more complex, which poses a number of challenges, like how to manage the surrounding areas with residents who already live there or how the use of public spaces may change. Addressing this calls for participatory planning and conflict resolution methods (and universities or large companies are not used to working or thinking in this way). The most important questions are the following: Who owns and manages the area? Who is responsible for what happens there? Where do public and private spaces begin and end? How to deal with the increasing flow of people and traffic? What is the nature and identity of a place? Last but not least, what is there for the citizens who already live there?

4. LINKING THE COMMON INTERESTS OF CITIES AND UNIVERSITY CAMPUSES

During the development process of the Modern Cities Program, not only new buildings were built, but also the users of existing campuses changed. Some faculties were given some space next to their current area because other units had left those places. This is not a unique phenomenon. The campus network in Helsinki has undergone major changes, as has Aalto University, which used two campuses in Helsinki when it concentrated all its activities on one campus in the neighboring city of Espoo in Otaniemi. In parallel with this process, Helsinki Metropolia University of Applied Sciences has merged its nearly 20 locations into four major campuses, one of which is the new campus in the

suburbs near Myllypuro. The Myllypuro campus is a pilot project of the Helsinki Baltic Live Campus project. Practices in Finland over the last 10 years show that merging educational institutes and campuses into larger complexes to make a more efficient use of university facilities can maximize synergies between different study fields and save money [8]. A campus development and redevelopment project in Delft was carried out as part of the BK (BK is the Dutch name of TU Delft's Faculty of Architecture and the Built Environment) City project, which resulted in a decline of the existing area. The root cause here was a campus fire.

The former facade, which had housed the Faculty of Architecture since 1970, was a 42,000 m² building with fourteen floors. The current BK City building was built in the 1920s with high ceilings and three main floors with a total of 36,000 m². This includes the extra floor space of the two extensions added to the original heritage building to accommodate some large facilities that can be shared [12].

The statement that a well-functioning campus has to be integrated into the environment and the local community, which also implies that development processes have to be carried out in partnership with the city [13]. The city of Helsinki has recognized that a highly educated population is the key to their success. Therefore, the city works closely with the university and the student network in the Helsinki Metropolitan Area. As an example, the rector and the mayor of the city hold regular meetings and collaborate on development projects. The focus of the cooperation between the city and the university includes developments that will make the area a more functional, sustainable city, boost innovation and entrepreneurship, and increase the international attractiveness of the area. The City of Helsinki recognizes that university research and studies can contribute to the development of new urban development solutions, such as smart and ecological transport solutions, implementation issues and urban planning.

5. UNIVERSITY OF PÉCS IN MAJOR ROLE OF SHAPING THE EARLIER EUROPEAN CAPITALS OF CULTURE CITY PÉCS

As it could be seen previously, a university can play a significant role in a certain city's life. Pécs, the former European capital of culture city declared its commitment in culture based city development where the education, and the university plays important role. In the following part, Pécs is going to be examined regarding from the side of university, future plans and tasks. In this part, the possible cooperation ways of the university and city are summarized for making better living and learning environment in Pécs city context.

5.1. The settlement development concept

The settlement development concept, which is a long-term urban development document, considers the university as one of the major economic sources of Pécs. The amount

spent by students studying here is estimated to be 15–20 percent of the GDP of Pécs [14]. The decline in the economic situation of the university and the significant drop in the number of students also have serious consequences for the economy of Pécs. An important tendency is that the city is less able to retain its graduates, as well as the strong labor-absorbing effect of Budapest and rural growth centers can also have a negative impact. The well-functioning partnerships (Baranya County Municipality, neighboring settlements, economic actors, Pécs-Baranya Chamber of Commerce and Industry (PBCCI)) play an important role in the reconstruction of the city. However, the data also show that while the university plays a significant role in educating the labor market, 58.32% of students come from the three counties of the Transdanubian region. Nevertheless, in the 5 years following their graduation, only 38.78% remain in the region. This also shows that if university campuses, or in this case the entire university system, have no connection with the market players, then the effect of the labor drainage becomes very high [13]. A good way to enhance the competitiveness of the city is to improve the cost-effectiveness of public services, jobs and incomes if the industrial and municipal infrastructure is developed and the city intervenes. The city administration and the university have recognized that both have the potential to achieve significant results if they develop a common strategy in which both parties retain their independence, act on behalf of the city with mutual goals and they work closely with economic actors and their representative chamber of organizations [15].

5.2. Integrated urban development strategy

During the development of the integrated urban development strategy, the analyzes and the social consultation of the materials have confirmed that the city's most pressing problem is the current low level of employment, which has a negative impact on keeping the students in Pécs, attractiveness, enrollment and investment. As a result, economic development factors receive considerable weight, as well as actions directly affecting employment. This does not mean that economic development is exclusive.

In order to maintain the number of university students, it is necessary to cooperate with the University of Pécs in order to strengthen and improve the supply side of the labor market: the aim is to take into consideration the needs of vocational training in the urban institutional system and to transfer them to the university. If necessary, it should also facilitate the achievement of the desired objective by initiating the restructuring of vocational and higher education areas in terms of economic development. In order to expand internationally, a project element defined in Integrated Urban Development Strategy (IUDS) is the establishment of the Pécs International University Training Center, where the complex development of the international education base regarding the University of Pécs, the servicing of the individual faculties, the training of the lecturers and the service of the foreign students can take place in an independent infrastructural way. The weight of foreign students is

constantly increasing in the composition of the University of Pécs, and the strategic goals of the university include a strong increase in the number of students. The vast majority of foreign students arrive in Pécs without knowledge of the language and country, thus, handling numerous cases of temporary residence and university life in Hungary and keeping in touch with the mother countries require significant administrative and other (personal) support for which an institutional system and infrastructure have to be created. The establishment of an International University Service Center would be a solution to this [16].

5.3. Sustainable urban mobility plan

Building on its commitment to sustainability and its strategic planning practices, in 2016 Pécs decided to develop a Sustainable Urban Mobility Plan (SUMP). The sustainable urban mobility plan fits in and builds on recent urban development documents, in particular the Pécs Urban Development Concept (UDC), the Integrated Urban Development Strategy and related sectorial documents. It also takes into account the state of transport projects, in particular the plans for the intermodal junction and the cycle path network; however, if necessary and possible, it may suggest corrections or a shift in emphasis. The Pécs Sustainable Urban Mobility Plan, in line with EU guidelines, focuses on people, city dwellers, rather than infrastructure and traffic. In order to support this, the Smart City Pécs program was developed, which, in cooperation with the University of Pécs, is developing a research, development, education and manufacturing base for applied environmental developments aimed at efficient, sustainable and inexpensive urban operation. When formulating the strategic goals of the development concept of Pécs, the balanced spatial structure was a priority objective. The long-term goal for the city is a clear and balanced traffic distribution system with adapting a well-functioning traffic management system to a changed traffic distribution system, as well as using traffic count detectors to continuously monitor traffic for immediate intervention.

The existing network is inadequate, and a further infrastructural development is essential. Instead of widening the inner roads of the city, the emphasis should be put on the distribution of traffic [17].

5.4. European green capital concept

The research within the program showed that a significant number of foreign students prefer cycling, which is not typical when looking at the cityscape. The main transport destinations for everyday use are campuses and areas in the city center. Cycling routes can be already found in the main areas, but the system is not extended to the whole structure of the city. Public transport typically means the usage of bus, which is accessible and affordable for everyone. One of the future plans for the university in the European green capital program is to co-operate with a city already defined in the Urban Development Concept and IUDS to set common goals and improvements. The idea of Technopolis Pécs can also be found here. In order to achieve these goals, the

management of the city decided to create new organizational frameworks. The city has long been involved in Smart City events and has joined the university's Smart City research and development program with the involvement of executives and experts regarding urban operations [18].

6. CONCLUSION

From the above mentioned arguments, it seems that in order to understand or even develop the area of a given university campus, the design area have to be enlarged in city context. In the case of the UP's western and "northern" campus, as is true of the entire university system in Pécs, the whole city system has to be taken into account in which UP is a strong economic, intellectual and environmental (built) factor with an essential interest in effective cooperation with the city. It creates a fruitful collaboration with people who live here or come here for a short time, with businesses that make revenue and jobs. In addition, the university itself is a great generator of jobs. In its current state, it operates within its inherited structural system. There are long-standing "walls", fences that can be interpreted on both physical and mental levels. It is essential to open up university spaces for the "public". The exterior, possibly the interior related to it, has to be interpreted as urban public spaces. Examples from other parts of the world point in this direction. There is definitely a closer connection between university units and their environment. When a walk is done around the separated, isolated sites today, in most cases fences are found around the campus. Service functions for university people have begun to emerge, but for the most part they are incomplete or remained on a rudimentary level.

The transport system focuses on cars. One of the primary reasons for this is that the road links mentioned above are still missing. Until they are developed in the area, there will be no significant change in the transport system. Once these are in place, a primarily cycling and pedestrian network that transcends the boundaries of the area becomes involved in the circulation of the city.

The paper shows that general guidelines for designing campuses are many times agreed with the development proposals. Interventions by any of them - university or city - do determinate the changings for the other. The decisions have to be made together by involving the local partners to fulfill the most useful results in different scales. Suggestions for specific campus solutions were not part of this phase of the research. Proposals considering the solutions for stand-alone campuses can be answered by further research. The examinations mentioned here should be scaled with a more detailed focus on the microenvironment.

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