



# An Evaluation of Urban Spaces on Urban Campus at Universiti Teknologi Malaysia Using Morphological Study

Siti Mazlina Zarmani<sup>1\*</sup>, Nurul Syala Abdul Latip<sup>1</sup>, Noor Hayati Ismail<sup>1</sup>

<sup>1</sup> Department of Architecture, Universiti Sains Islam Malaysia-(USIM), Nilai 71800, Negeri Sembilan, MALAYSIA.

\*Corresponding Author (Email: [SMazlina@jkr.gov.my](mailto:SMazlina@jkr.gov.my)).

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## Abstract

The existing urban campus is very much affected by rapid urbanization and the globalized knowledge economy. It must adapt its development to these challenges to ensure its continuous significance in the context. This study evaluates the new urban spaces of the Universiti Teknologi Malaysia Kuala Lumpur (UTM-KL), an urban campus that had evolved since the 1950s. Using a qualitative method for a single case study, a morphological study was done based on visual observation, and document review. The finding reveals that the new development applied a different planning approach to the original campus planning, affecting the urban spaces. It is recommended to design the new planning development concerning the existing context to maintain the spaces' value towards retaining the sense of belonging and attachment to the place.

**Disciplinary:** Architecture and Sustainable Urban & Real Estate Development, Urban and Regional Planning, Malaysia History.

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## 1 Introduction

The world's urban population has been overgrowing and is expected to increase by 2.5 million between now until 2050, where the urbanization trend has been fastest in developing countries (The World Bank, 2018). A globalized knowledge economy requires cities to stimulate business and innovation to remain relevant. "Education has always been one of the most important functions of cities" (Million et al., 2017). Campuses as places for learning and the city have a mutually beneficial relationship to stimulate innovation, a common goal in the knowledge economy (den-Heijer & Curvelo-Magdaniel, 2018). The rapid urbanizations and the impact of

globalization will create challenges for urban campuses in the twenty-first century. Therefore, how urban campuses choose to respond to these challenges to ensure their continuous significance as knowledge contributors in the urban context is essential.

Major evolutions of urban forms in urban campuses redefine their urban spaces. The urban campuses' physical form is changing in response to the demand for an increasingly competitive and globalized knowledge economy (Benneworth et al., 2010). Urbanization has changed campuses' spatial structure and affects urban spaces. The traditional urban campuses gradually developed a new type of campuses (Zijian et al., 2017). Carmona et al. (2003) explain that "traditional urban spaces are evolved and has caused the replacement of buildings on the existing plots". Therefore, the campuses are changing their urban space due to their spatial needs (Benneworth et al., 2010).

However, the attachment of the campus residents as the primary users towards the traditional urban spaces must not be denied. All campuses have a unique location that helps to form their unique identity as an institution and has a relationship with the communities inhabiting that place (Goddard, 2018). "Although communication is now global, location, proximity, and uniqueness still matter" (Grau, 2014, as cited in Goddard, 2018). There is the interaction between global and locality that impact human activities, where human experience is local in terms of territorial and cultural. Moreover, human-level connections are ever-shrinking due to urbanization. Hijjas (2017) argues that we have lost the ability to create a meaningful intervention that connects people, especially on public realms that respond to a place's context and rediscover the meaning of small pocket spaces, those shared areas that connect the old and new development. To look at this issue from the morphological dimension is essential to evaluate the urban spaces of an urban campus that has passed through the continuous urban development of the dynamic process to remain relevant and significant.

## 2 Literature Review

The morphological dimension is used to understand evolution and change. The morphological study is to look at "the layout and configuration of urban form and space", where Carmona et al. (2003) divided two types of urban space systems known as "traditional urban space" and "modernist urban space".

Carmona et al. (2003) describe the traditional urban spaces are the spaces within urban blocks that define and enclose the external space. The modernist urban spaces are within the free-standing pavilion buildings in landscape settings. The urban form in traditional urban spaces is small scale with fine grid meshed street that is well integrated and connected. Modernist urban spaces are large scale with coarse grid and emphasize the road network that segregates the urban spaces. Furthermore, Trancik (1986) argues that "space" in the traditional urban spaces can be measured with definite boundaries, discontinuous, closed, static, and serial in composition. Whereas, the "antispaces" in the modernist urban space "is shapeless, continuous, lacking perceivable edges or form".

Four keys morphological elements are land use, street system, plot pattern, and building (Conzen, 1960). Conzen belief these elements in the morphological map will become the basis rooting for future planning (Whitehand, 2001). Carmona et al. (2003) discuss these four elements. Firstly, land uses often lead to redevelopment and new buildings to replace the existing buildings in older areas that cause plot amalgamations and changes in the street pattern. Just minor development that passes through adaptive reuse by converting the existing buildings to another usage. Secondly, the street pattern consists of a grid or organic planning described into a coarsely or finely meshed street pattern. Carmona et al. (2003) contend that modernist roads often cut through the street patterns of older areas that create fragmented urban spaces. It may affect the quality of visual and physical permeability and also the accessibility in the environment. Next, the plot pattern is urban blocks that are typically subdivided into a smaller plot that changes through amalgamation or subdivision that may remove most of the earlier forms' evidence. Finally, the building structures are the constituent elements that connect the urban blocks, define the street and squares, thus characterized by the scale, height, and significance. Some buildings' designs symbolically represent the development that will last longer than others, which become particularly meaningful to the users and visitors. Therefore, these elements will become the principles to evaluate the modernist urban spaces compare to the traditional urban spaces.

The urban forms are the key elements that affect the qualities of urban spaces. The morphological analysis is based on urban form through three principles. Firstly, the form that consists of buildings, open spaces, plots or lots and streets; secondly, the resolution that is corresponding to the building, street, city, and region; and lastly, the time that shows the continuous transformation and replacement (Moudan, 1997). Urban form is both physical and social elements where there is an interrelationship that influences each other to shape the urban fabric (Shamsuddin, 2011). These encapsulate the spirit of the place (*genius loci*) that gives a sense of belonging as urban form gives impacts to its residents (Barke, 2018). Sustainable urban forms are important in influencing economic efficiency, social configuration, and environmental performance (Aina et al., 2013; Adhya & Plowright, 2010). The urban form acts as the dynamic connection with urban cultures and urban activities that shape urban life (Adhya & Plowright, 2010). Initially, the modernist intends to create a healthier environment than previous industrial development that detached the buildings to maximize the sun, increase ventilation and avoid crowded effects (Carmona et al., 2003). Thus, the architecture of objects in modern urban spaces started. Aina et al. (2013) argued that modernists use extensive spaces and the fragmentation of functional spaces. Moreover, the dependency on car increases tremendously, impacting the urban form and the changing of activities in the space in the modernist urban spaces design.

Urban spaces act as an "aesthetic entity and behavioural setting where it focuses on the diversity and activity that help create successful public places" (Carmona et al., 2003). It reflects the main aim of place-making in urban design, where people involve the integration of urban spaces and activities to create a thriving place. Besides, the urban spaces are "public realm which is

defined as the public face of buildings, the spaces between frontages, the activities taking place in and between these spaces and managing of these activities" (Carmona et al., 2003). Trancik (1986) divided urban spaces into hard and soft spaces. The hard spaces are bounded by architectural walls, a three-dimensional frame that defines the edges and creates an enclosure, a two-dimensional pattern of the ground-plane, and objects in space that becomes the focal points. Instead, the soft spaces are those dominated by natural environments such as parks and gardens that not require the same degree of enclosure or defined boundary.

The urban campus can be divided into two different spatial configurations, gated within the city or integrated with the city (den-Heijer & Curvelo-Magdaniel, 2018). Urban campuses have changed from mono-functional to multi-functional and from exclusively academic towards mixed campus communities. Therefore, it is vital to evaluate gated campus where den-Heijer & Curvelo-Magdaniel (2018) defines as "city contains the campus", where campus areas inside the urban fabric have clear demarcation or borders such as fences, roads, or natural features.

### **3 Methodology**

Evaluating the urban spaces in an urban campus requires an in-depth study of urban campuses in their natural setting. The data need to be real, rich, and deep to ensure a deeper understanding of existing urban spaces. "Qualitative research occurs in natural settings, where human behaviour and events occur" (Creswell & Creswell, 2018). Thus, the qualitative approach of a single case study method will be used. Universiti Teknologi Malaysia Kuala Lumpur (UTM-KL) has been selected for the case study due to its long history of evolution from technical school towards international university. The morphological study, using visual observation, and historical document review were the techniques employed for data collection. The solid and voids of figure-ground diagrams were used to evaluate the form and shape of local patterns of campus development and the process of change. Solid as the figure, while void as the ground to clarify urban spaces' structure (Trancik, 1986). The evaluations are based on land uses, plot patterns, street patterns, building structures, and soft space. Then, triangulation between these techniques was done to understand the overall evolution of the urban spaces in UTM-KL.

#### **3.1 The Case Study: Universiti Teknologi Malaysia Kuala Lumpur (UTM-KL)**

Universiti Teknologi Malaysia Kuala Lumpur (UTM-KL) is among Malaysian's premier higher learning institutions. It was the first technical school built on the 47-acre site on Gurney Road. It was built due to the economic growth of Malay-Peninsular, which demands the workforce to expand the infrastructure such as roads, railways, electricity, and telecommunications (UTM, 2005). It has passed through several phases of development that create changes in the urban form. Earlier, from a technical school, it was upgraded to Maktab Teknik in 1955, then upgraded to Institut Teknik Kebangsaan in 1972, and later to Universiti Teknologi Malaysia in 1975. The increase of students in technical science and technology requires larger campus spaces to cater to a higher

number of students (UTM, 2005). The new campus on the greenfield area in Johor was officially opened in 1985. Later in September 1989, the Johor campus became the main campus while the UTM-KL is the branch campus. However, UTM-KL is still relevant because of the strategic location in Kuala Lumpur's heart, which is only 5 kilometres from the KLCC Twin-Tower. Moreover, UTM-KL has started to become an International-Campus since 2008 to positively impact the surrounding community, enhance the education and knowledge hub in Kuala Lumpur.

## 4 Result and Discussion

Through morphological study, the evolution of Universiti Teknologi Malaysia Kuala Lumpur (UTM-KL) from 1955-2020 has affected the urban spaces (Figure 1). The term old urban spaces will represent the earlier planning between 1955-2000, while new urban spaces will represent the latest development between 2010-2020. Further discussion is based on the morphological elements of land uses, plot patterns, street patterns, and building structures (Conzen,1960), and the element of soft spaces (Trancik,1986).

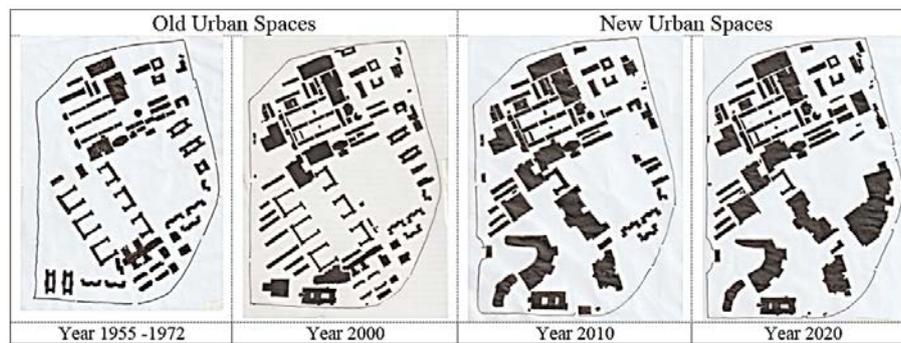


Figure 1: The evolution of UTM-KL.

### 4.1 Land Uses

The change of urban form in UTM-KL from the horizontal towards vertical in new development is due to the land size constraint and current demand (Figure 2). The land uses are mixed to cater to all the different functions between academic buildings, administration buildings, accommodations, quarters, sports facilities and other shared facilities.

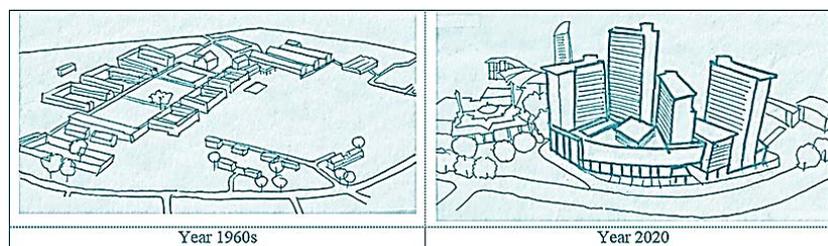
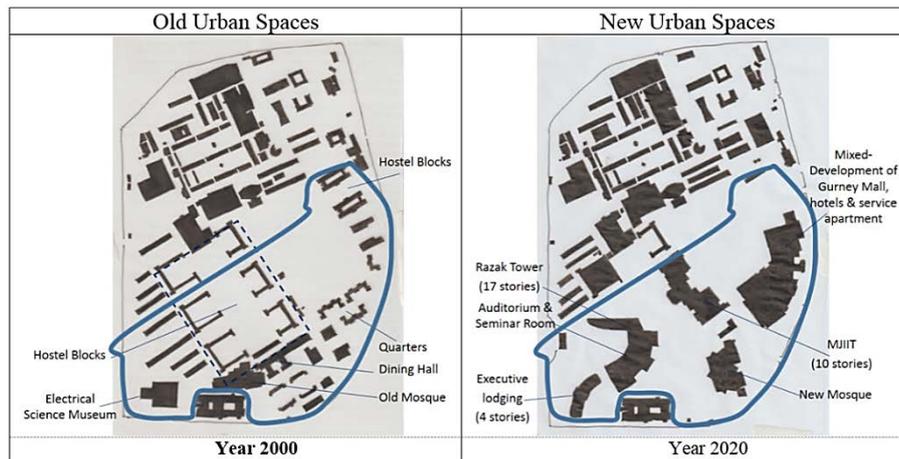


Figure 2: The changes of urban form.

Major redevelopment happened between 2010-2020, where the university gains high allocation in the RMK-9 budget to change UTM-KL into a world-class university. The new mosque, completed in 2010, replacing the old mosque. It can cater to around 3000 campus residents and surrounding communities. The seventeen stories of Razak-Tower, ten stories of MJIT-building, four stories of executive lodging, and two stories of seminar rooms and auditorium were completed

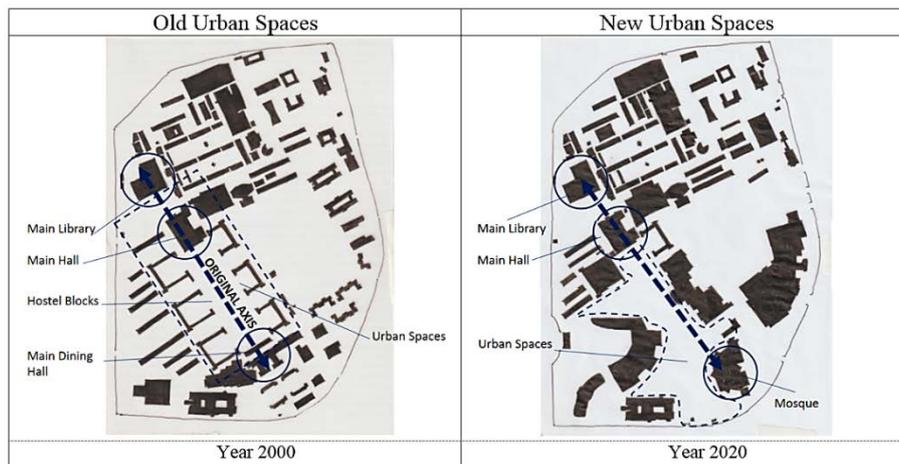
in 2011. These redevelopments had demolished the earlier hostel blocks, quarters, dining hall, and Electrical Science Museum built in the 1980s that has the Brutalism Architectural approach (Figure 3). The demolishing of the Electrical Museum, launched by the then Prime Minister, Tun Mahathir Mohamad, was considered a loss by Adam (2009) because of its architectural significance, and it was a symbol of the university's achievement as the leading technical university in Malaysia. The redevelopment and creation of new buildings rather than adapt and convert the existing buildings had removed most of the evidence of earlier forms (Carmona et al., 2003).



**Figure 3:** The replacement of new buildings.

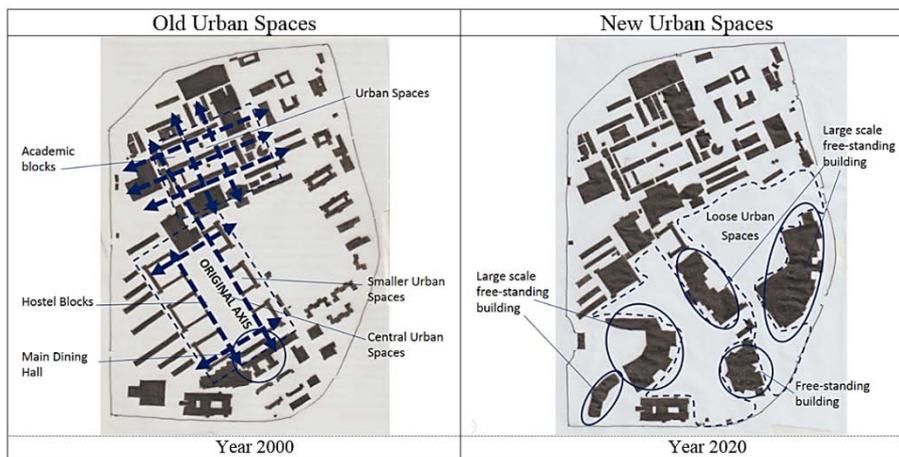
Later, the mixed land-use development facing Jalan-Maktab was completed in 2018 to replace the old quarters and female hostels. It consists of a shopping mall known as "Gurney-Mall" that provides a diversity of food and beverages, varieties of shops, money changers, ATMs, pharmacy, spa, and entertainment to cater to the different culture of people. Moreover, there are two hotel blocks, service apartments, and shared facilities such as the different sizes of conference halls, banquet, swimming pool, and gymnasium that provide the city lifestyle. The developments are funded by UTM due to the cutting of government funding to public universities. Besides, public universities were given the autonomy to determine the university's direction and income sources.

The major redevelopment in UTM-KL has impacted the urban spaces. The primary axis in the old urban spaces has been blurred. Initially, the U-shaped six hostel blocks were anchored to the main library and main hall on the top and main dining area on the bottom (Figure 4). Although the anchors on the top remained as the lower part's changes, it changed the quality of urban spaces due to the loss of the original enclosure. This axis is essential to show the earlier campus spatial configuration where each hostel has its own small urban space connected to one primary urban space. Original building lines and dominant axis must be respected to ensure the existing pattern is not disrupted (Shamsuddin, 2011). It is crucial, as an old campus that has passed through different phases of development, there is a sense of belonging to the people who have experienced the campus life there. Therefore, the design must respond to the context where Shamsuddin (2011) argues that the principle of contextual design to respond to the earlier setting can be done through many forms depending on the surrounding characters and the sense of place.



**Figure 4:** The changes of the earlier axis.

The buildings in the old urban spaces act as parts of the urban blocks that define and enclose an external space. It is where both ways benefit when " the blocks define the space or space define the blocks" (Carmona et al., 2003). Undeniable the importance of Razak-Tower as a landmark that can be seen from far and become the symbol of UTM-KL as an International-Campus. However, the shape of a new development's free-standing building in landscape settings has changed the old urban spaces and reduced the enclosure. The new buildings become an isolated object in open spaces or open spaces that contains buildings (Figure 5). Thus, it becomes a multiplication of objects and neglects the urban fabrics (Carmona et al., 2003). The voids between them are dead public spaces (Trancik, 1986).



**Figure 5:** The building scale's evolution.

Moreover, these changes reduced the connectivity between buildings. The new covered walkways built that are not attached to the buildings are not suitable for the tropical climate, which usually rains heavily together with the wind. Old blocks in the campus prove how the sidewalks need to be attached to the buildings and have a controlled opening against tropical climate.

The buildings in old urban spaces are small scale, low rise, and about similar heights. It creates highly connected urban spaces that encouraged pedestrian movement inside the campus. However, the new buildings are large blocks where some are very tall buildings, and some have large building footprints. Thus, it reduces the physical and visual permeability within the campus as Carmona et al. (2003) highlighted that old urban spaces with fine grids create a highly connected

mass of urban blocks while the coarse grains reduce the movement dimension and connectivity. The urban form is predominantly vertical instead of horizontal and positioned over a large ground plane, resulting in the vast open spaces that are seldom used or enjoyed (Trancik,1986). Good urban spaces allowed for movement and activities symbiotically (Carmona et al.,2003). Therefore, the overlapping realms of both movement space and social spaces have a symbiotic relationship that is important to create a livable campus.

Moreover, Gurney-Mall has become one of the successful public places in UTM-KL that attract the campus residents and surrounding communities that positively impact the economic gain for the urban campus. However, these magnets had attracted activities towards inside large air-conditioning buildings, rather than outside areas. Consequently, it contributes to unlivable urban spaces between buildings, which have become the space for movement. Bashri (2016) mentions that "even though enclosed, shopping malls now are what marketplaces were in the past but cause loss of street life". Shamsudin (2016) contend that "our street life suffers as people are more excited to shop indoor which threat the public spaces unless we make the streets more walkable that create a strong reason to walk that cater physical, behavioural, social and psychological aspects".

## 4.2 Plot Pattern

The plot pattern's evolution changed the old urban spaces (Figure 6). Some academic plots were expanded due to more demand for the internal spaces. Yet, some expansion has denied the importance of urban spaces in the centre of the courtyard, which has disturbed the urban form's original setting. It reduced the size of urban spaces and also the visual and physical permeability. Besides, some of the leftover spaces in the old urban spaces are not well maintained. If this becomes prolonged without any revitalization plan, the spaces may become unused, demolished, and may lead to the loss of memories of the original settings.

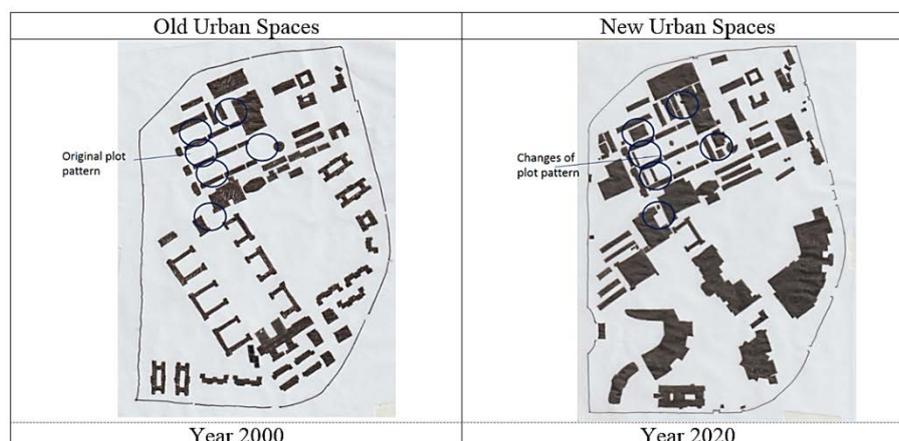


Figure 6: The plot pattern's evolution.

## 4.3 Street Pattern

The street patterns of the old urban spaces concentrated at the perimeter of the campus, while all the academic buildings located in the middle, create a walkable campus. The fine grids in

the old urban space gave more routes for the pedestrian and increased the permeability visually and physically (Carmona et al., 2003). It is where movement and social interaction can happen symbiotically in urban spaces between buildings. However, the street patterns have changed tremendously, and the large-scale buildings evolved the campus to be monopolized by the vehicles and car parks (Figure 7), which disrupt the urban spaces. The superblock massing creates a coarsely meshed road pattern (Carmona et al., 2003). Besides, large buildings are subjected to fire-safety requirements that required an island site with service roads surrounding it. It leads to the segregation of public space and fragmented urban spaces that may create conflict between pedestrians and vehicles. Mainly, when the tarmac is used as street material makes the car more dominant than the pedestrian. Physical improvement through street materials, controlling access such as bollards or schedule time, and urban landscape design may enhance the new urban spaces.

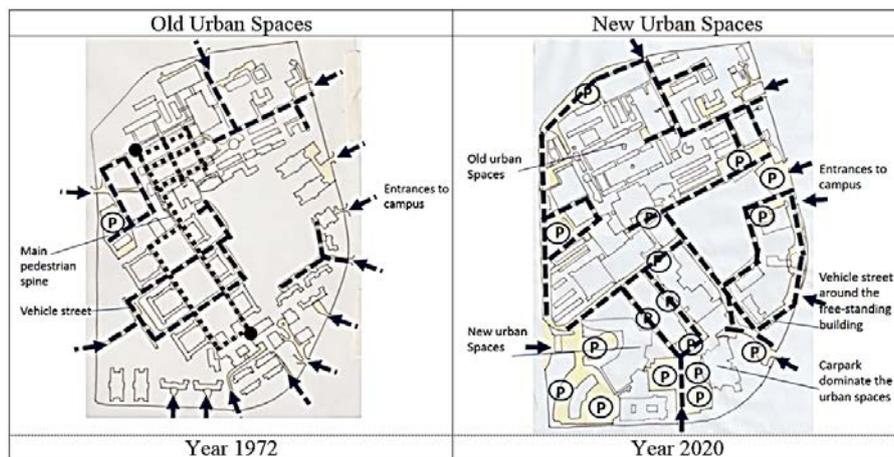


Figure 7: The street pattern's evolution.

#### 4.4 Building Structures

In UTM-KL, Dewan Tan Sri Ainuddin Wahid as the main hall and Perpustakaan Sultanah Zanariah as the main library, are the primary building structures with historical value located in Laman-Ilmu, an old urban space (Figure 8). The main hall was expanded through time has significant value to the users from 1955 until now. Besides, the main library was built in the 1980s has architectural significance, constructed in the Brutalism concept that shows the purity of raw concrete materials representing the era. Both of these buildings contribute to the hard space by the buildings' enclosures, while the large matured yellow flame trees represent the soft space. It enhanced the character and identity of the old urban space, where it links to the past and creates meaningful social connections.

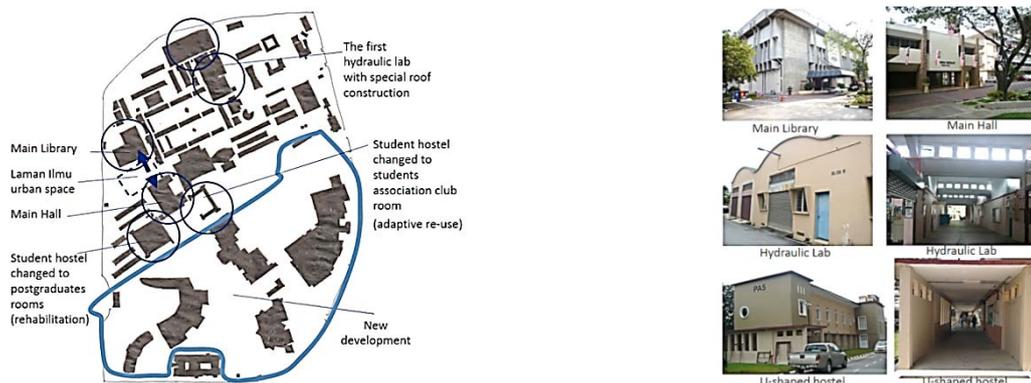


Figure 8: The significance of building structures.

## 4.5 Soft Spaces

The dominant soft spaces in UTM-KL is the “padang”, the football field (Figure 9), which has turfed surfaced used for sports and recreational activities. Soft spaces are those dominated by natural environments that provide recreation opportunities (Trancik, 1986). As a small size urban campus, open spaces like *padang* always become the first choice to be taken for new development. Fortunately, the local authority requirements required some percentage of open spaces that need to be retained for environmental purposes. The recent new mixed-development has taken part of the *padang* with reduced sizes. Besides, the new mixed development is operated 24 hours daily, and act as separate entities that are not restricted to the university schedule. Thus, the perimeter of *padang*, located adjacent to the new mixed development is fenced to demarcate the campus site that needs security control. The fencing creates barriers toward the *padang*, reducing access and function where it is meant to be one of the significant urban spaces in the campus.



Figure 9: The main soft spaces.

Moreover, the new landscape approach has changed the old urban spaces in terms of choice and position of trees, surface treatment, and level change. The earlier urban spaces mostly are flat and accessible. The new development, especially between the Razak-Tower and MJIT-buildings, has replaced this original flat land, limit the accessibility in urban spaces (Figure 10).

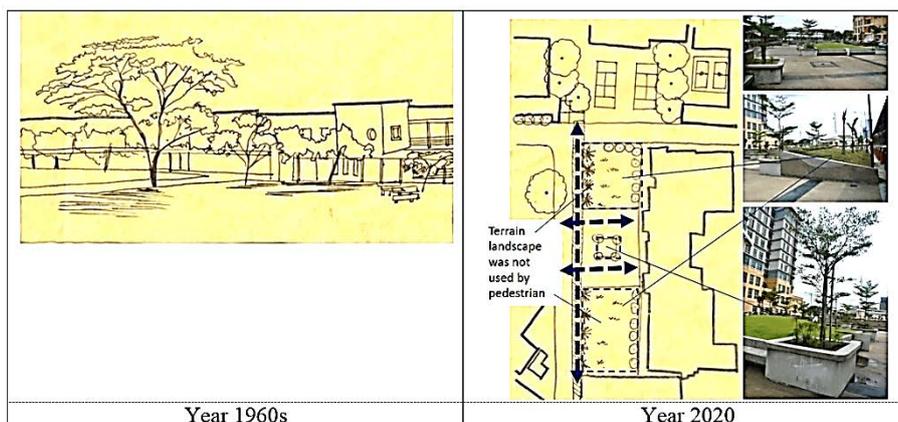
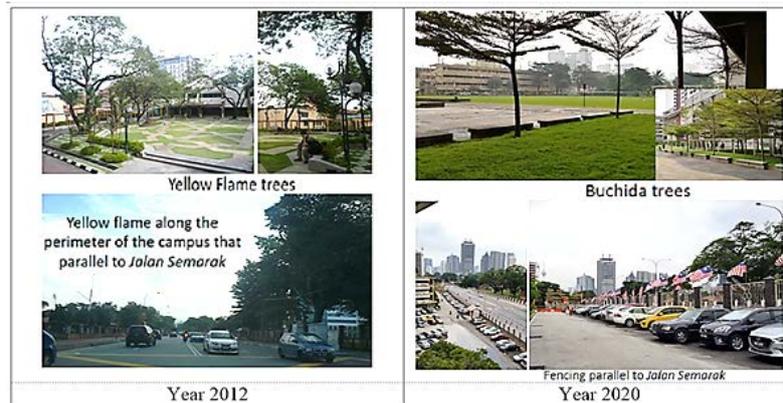


Figure 10: The change of landscape's approach.

Yellow-flame and *ketapang* trees, the matured tropical trees with large canopies, have a strong association with this historic urban campus. Whereas, buchida trees were selected for new development as prevalent in the market to meet the current demand of landscape concept. These species have a beautiful layer's profile that allows for diversity but diminish the original character. As a result, the character of the original ambience of historical higher learning of UTM-KL is lost. Bashri (2016) mentions that mature, large canopy rain trees form a significant part of the urban landscape, but we always take it for granted.



**Figure 11:** The expansion of Jalan-Semarak affects the landscape.

Furthermore, Jalan-Semarak is expanding from one lane to three lanes with an additional route to the highways, due to rapid urbanization. Accordingly, UTM-KL needs to surrender the land to the local authority. The large matured trees at the perimeter of the campus along Jalan-Semarak were cut down. Without these trees, the campus perimeter becomes rigid with the presence of the fence only (Figure 11).

Based on the result and discussion, Table 1 compares the old and new urban spaces of UTM-KL. The old urban spaces contain buildings as part of urban blocks in the human scale, which defines the courtyard, well-integrated and connected. In this walkable environment, streets connect the urban spaces within the campus, and the landscape consists of large and shaded tropical trees. Instead, the new urban spaces are dominated by free-standing, large-scale buildings that create antispace between buildings, loose campus configuration, fragmented urban spaces due to the street around the buildings and using non-tropical trees for the landscape.

**Table 1:** The comparison between old and new urban spaces in UTM-KL.

Old Urban Spaces (1955–2000)	New Urban Spaces (2010–2020)
Buildings as parts of urban blocks.	Free-standing buildings in the campus landscape setting.
Small-scale.	Large-scale (superblock-system).
Define courtyard and walkways create an enclosure.	Loose-enclosure.
Integrated and connected.	Integrated, but there is a large antispace disrupted by car park (fragmented urban spaces).
Structured-configuration (courtyards that strengthen the campus spatial structure).	Loose-configuration (image of ad-hoc planning).
Street pattern dominates the perimeter of the quarters (urban blocks)-create a walkable environment.	Street pattern surrounds a single block building (conflict between vehicle and pedestrian).
Tropical trees (large and shaded trees).	Non-tropical trees.

## 5 Conclusion

Globalization that focuses on knowledge-based economies creates a high demand for students' enrollment on the campus. Thus, expansions of the infrastructure, facilities, and urban spaces are required. In an urban area, the land is a critical factor, and the cost is very high. Some development needs to cater to high density within a small land size to meet the urbanization plan, whether to infill the existing empty site or demolish the existing buildings. These impact the urban form, where the earlier layout configuration may contain the historical value. In UTM-KL, the new development reflects the modernist urban spaces approach, different from the old development of traditional urban spaces. This new approach does not seem to respond to the original context in terms of land uses, plot patterns, street patterns, building structures, and soft spaces. UTM-KL has many opportunities to improve and enhance the new urban spaces by listing the main elements that have significant value towards the campus and maintaining them to retain the sense of place. Besides, the old urban spaces also need to be revitalized to make them relevant. The improvement in both old and new urban spaces will support more educational activities and create a more livable urban campus that will improve the users' quality of life.

## 6 Availability of Data and Material

Data can be made available by contacting the corresponding author.

## 7 Acknowledgement

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**Siti Mazlina Zarmani** is a PhD student at the Department of Architecture-USIM-Malaysia. She got her Bachelor's degree in Architecture from UiTM-Malaysia and an MSc. in Sustainable Urban Design from UTM-Malaysia. Her research relates to Campus Design.



**Dr. Nurul Syala Abdul Latip** is a Senior-Lecturer at the Department of Architecture-USIM-Malaysia. She earned a Bachelor of Architecture (Hons.) from UTM-Malaysia, a Master of Built Environment-(Sustainable Environment) from the UNSW-Australia, and PhD in Built Environment-(Architecture) from the University of Nottingham-UK. Her research relates Sustainable Development, Urban Design, and Heritage.



**Dr. Noor Hayati Ismail** is a Senior-Lecturer at the Department of Architecture-USIM-Malaysia. She got a BSc. in Architecture-(Distinction) from UM-Malaysia., a Master of Landscape Architecture from UPM-Malaysia-and a PhD in Architecture from UKM-Malaysia. Her research relates Landscape Architecture, Heritage Design and Sustainable Architecture.

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