



Performance of Outdoor Physical Character of Kirkuk University Campus

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ABSTRACT

The performance of outdoor space of a built environment determines whether it is successful and responsive to the human needs and capable to conduct its function well. The aim of this study is to examine to what extent the outdoor environment of Kirkuk University-Iraq is able to offer a responsive environment as well as put design insights for future development. The study is limited to the main campus located in Sayyada district, as it is one of the relatively newly established campuses in Iraq. The methodology used in this study includes both quantitative and qualitative techniques. As a quantitative technique, a questionnaire distributed among 100 users including students, faculty and staff was used. Whilst, an observation survey was used as a qualitative method to support the results. Triangulation of the findings was utilized to give more reliability to the findings. Findings revealed several issues on design aspects related to building arrangement, path layout, walkability, legibility and landscape. Consequently, a framework for future expansion was derived, which can act as guideline to develop this campus and any other campus of similar characteristics.

Keywords: campus; performance; outdoor, environment; design; urban

1. INTRODUCTION

Given the role universities can play in a society's advancement, creating campuses of successful environments has become a fundamental goal, whether, for developing the existing ones or establishing new ones. The way in which a physical campus form is planned and designed plays an indispensable role in promoting campus performance. For this reason, many universities around the world have emphasized promoting strategies for creating campuses according to the key principles of urban design and sustainability indicators (Davis and Wolski, 2009). As university campuses are often established in phases, they need development over time in order to accommodate the occurring needs. Such development needs to be done according to objectives set by designers and decision makers from the outset. Urban form characteristics affect the way people live, where physical form can promote public health and life quality

when it is functional and cost effective (Al-Akkam, 2015). Therefore, an assessment of campus environment is required to determine to what extent the design have succeeded to introduce an environment that is conducive for learning, living, and even shaping students' behavior (Shamsuddin *et al.*, 2007, Campos, 2008). It also enables putting required indicators for the future development.

As the main campus of Kirkuk University is considered one of the relatively newly established campuses in Iraq and it has not yet completed all its development phases, a need to assess the current physical character of the campus is required to provide design insights for the coming development stages. Eckert (2012) argued that assessing campus outdoor physical environment would enable administrators to comprehend the level of satisfaction students have with the physical campus environment and which areas, if improved or left to languish, would have the greatest impact on campus performance. Hence, design indicators for the future progress can be, then, formulated based on the assessment carried out.

Accordingly, in the scope of this research, (campus performance) can be defined as the extent to which the outdoor physical environment on campus is capable to meet its users' needs required for a successful learning process and sound quality of life. The purpose of this research is to examine the current campus physical form of Kirkuk University in terms of its ability to support campus life, particularly for students and put insights for future development.

This study aims at introducing an understanding of the mutual relationship between the outdoor physical character and campus community exemplified by students, faculty and staff. As a result, problematic spots as well as positives related to this relationship would be highlighted in order to develop a framework for future improvements of the campus.

1.1 The role of campus design features in campus performance

Campus physical environment plays an essential role in influencing students' life quality, thus, increasing their attraction towards the higher institution. Establishing campus environment of well-performance and compatible with the current and future needs of campus community has become an urgent requirement for the majority of universities. This is based on the fact that universities nowadays represent the main centers of knowledge for societies (Abd-Razak *et al.*, 2012). Moreover, the creation of successful outdoor environment on campus contributes to providing opportunities for higher education institutions to perfectly meet their objectives in learning, displaying progress principles as well as be as models for wider communities (Franklin *et al.*, 2003). This obviously discloses the importance of paying greater attention to enhance campus environment to achieve those objectives.

Although, it can be argued that literature on campus planning is somewhat rich, little has been said about designing campus outdoor areas as well as the correlation between campus physical structure and its performance (Al-Akkam, 2015, Salama, 2008). This study is to examine the efficiency of campus environment putting indicators for future development; so, it is related to camps design characteristics. Campus design is defined as: the process of careful site planning and three dimensional setting of physical components, encompassing the strategic placement of buildings, streets, walkways, gathering spaces, and greenspaces as well as the spatial relationships between them. It also concerns the setting of both natural and artificial landscapes and describes the physical layout of campus and the features observed by people whether on foot or in vehicle (Dober, 1992, Chan *et al.*, 2009). Whether a campus has an effective physical character mainly depends on design quality, where a successful campus design represents a procedure to create functional and efficient environment that meets the diverse needs of the academic institution. Thus, drawing upon good design, planning and greenspace management is the only way for a university to possess a campus that has the potential to provide a successful learning space, with all accompanying required activities.

In this context, principles of urban design arise as crucial features that determine the quality and performance of the built environment. A campus as a microcosm of the city, needs to distinguish the value and prestige that architecture can provide as an outward symbol of educational body (Al-Akkam, 2015). Compact physical form is one of urban design strategies for enhancing the performance of a built environment. This idea can contribute to minimized travel distance, less car reliance, and enhanced walkability, which lead to better community life quality (Chen *et al.*, 2008).

A concept called “Total environment “ was presented as a design principle for creating campus environment of efficient performance, which refers to the formation of an area of multi-functions by the implementation of space allocation system on campus (Burns, 2001). According to this idea, a mix of functions such as academic, residential, facilities, business and social uses are accommodated in one space. As a result, a livable environment can be achieved, where users can find most of their daily needs at the same place. Literature also indicated the design of circulation systems as a crucial factor to the quality of campus life, wherein they act as liaison of all campus parts and is necessary to support the activities on campus (Dober, 1992). For most campus users, landscape is also decisive in providing an imageable milieu for campus life Accordingly, campus design can contribute to expressing institutional identity through identifying meaningful places to students and pursuing to care for them, where distinctive lively spaces on campus are critical to institutional identity. Hanan (2013) suggested that every day users’ needs on campus should affect the way open spaces are designed. She also concluded a set of characteristics significant in designing successful open space:

- Be located where it is easily accessible to and can be seen by potential users.
- Clearly convey the message that the place is available for use and is meant to be used.
- Be beautiful and engaging on both the outside and the inside.
- Be furnished to support the most likely and desirable activities.
- Provide a feeling of security and safety to would be users.
- Encourage use by different subgroups of the likely user population, without any one group's activities disrupting the other's enjoyment.
- Offer an environment that is psychologically comfortable at peak use times, in regard to sun and shade, windiness and the like.
- Allow users the option, either as individuals or as members of group, by using it for special events, or by temporarily claiming personal spaces within the setting.
- Be designed with equal attention paid to place as an expression of visual art and place as social setting.

This indicates that design considerations for making a good urban place are concentrated around responses to the urban conditions and people's presence in the urban environment. When elements of the physical environment are taken into consideration in terms of the concept of space and structured environment, they may be defined as the environment's helpfulness for individual and social uses. Thus, outdoor public space needs to generate a sense of place, provide focal points, allow a plentiful variety of seating and include natural elements (Chambers, 1998, Aydin and Ter, 2008). Therefore, examining to what extent the principles, elements, and concepts undertaken in the current design are able to make the environment embraces users' needs is crucial for insuring the success of next developments.

University role for the society including spatial-aesthetic, social and cultural values make it imperative to take into account the importance of designing campus environment to be competent to conduct its tasks. The urban environment of university campus should be designed according to criteria that have physical response to its varied functions and be as a paradigm of interconnection and confidence among students, faculty and visitors. The design should also support the physical harmony indicating what this educational institution means (Abdulsahib and Alkhuzae, 2008, Neuman, 2013). The correlation between campus design and the ability to conduct its function was obviously expressed by Dober (1992) who argued that campus design process including topography, landscape and building masses needs to meet the optimal function and raise the most beautiful feeling. He revealed that designing campus outdoor spaces represents a physical means for expressing the current setting and future expansion of the site.

According to him campus design is “ the art of campus planning, the culminating act of those processes and procedures that give form, content, meaning, and delight to the physical environment serving higher education” (1992). It can be said that creating a well-ordered, functional and aesthetical outdoor environment is the main goal of campus design process. Well designed outdoor spaces of the campus can be described as not merely leftover spaces between campus buildings, but a series of designed places forming an environment comprised of outdoor spaces. Resulting spaces are supposed to lend a sense of safety, encourage the participation with the community supporting social interaction and pleases everyone at all levels (Abdulsahib and Alkhuzae, 2008). Based on the mentioned above, design features can determine to what extent the outdoor spaces on campus are capable to perform well and accommodate successful learning, living and working activities. Therefore, assessing the current output of campus design should be the base to put suitable design insights for the future development that is supposed to achieve a successful campus environment with better performance.

2. MATERIALS AND METHODS

Both quantitative and qualitative methods were adopted to conduct the research, where questionnaire was used as a quantitative technique, while observation survey was utilized as a qualitative method. The questionnaire is an instrument that was carefully designed to get feedback from campus users on the physical environment. The purpose of the questionnaire is to get data about campus design based on users' perspective. This includes their opinions and perceptions on the quality and amount of physical elements, compatibility of the physical environment with their activities and uses, visual and aesthetic aspects and so on. The subjects of the questionnaire are campus users including students, faculty and staff, but the focus was on students as a dominant category. This is based on the belief of Dahle and Neumayer (2001) that as students represent clients of the campus, they can easily express their criticisms on campus environment and demand reform on varied issues in this environment. Therefore, campus users' points of view, particularly students can provide valuable information related to campus design and performance issues. Questionnaire copies were distributed randomly to a sample of campus users comprised of 100 respondents including beside students, faculty and staff members. Response rate was 87%, where 87 questionnaire copies were returned. In this process, campus users are considered as main source of information to examine the physical environment on campus, where their perceptions and opinions can provide important viewpoints when analyzing or designing any “educational setting” (Shamsuddin *et al.*, 2007, Moos, 1979). To cover all campus areas, questionnaire distribution encompassed most of the academic departments. Data obtained by the questionnaire were statistically analyzed and graphically presented using Microsoft Excel.

Qualitative method represented by observation survey was applied to get additional information used to explain and interpret users' responses and support the results obtained quantitatively. This method included gathering information on the physical setting such as building layout, circulation systems, open spaces, architectural style and façade designs as well as landscape availability, quality and appearance. It also covered human behavior and activities in the outdoor environment; this is similar to Shamsuddin *et al.* (2007) and Abd-Razak *et al.* (2012). This process included walking through campus areas, taking photos and recording notes.

Triangulation was used in analysing the results in order to obtain reliable and valid conclusions. Through this method, a cross verification for the findings is possible by the combination of data sources such as statistical data, observations as well as theories and secondary data.

2.1 Kirkuk University (main campus)

Kirkuk University is deemed one of the relatively newly established universities in Iraq, where it was founded in 2003 to initially contain four colleges. In the present, it includes 15 colleges covering varied fields of knowledge. It offers opportunities of both under graduate and postgraduate studies. Main campus of the university is located in the southwestern suburb of Kirkuk city named Al-Sayyada (Figure 1a).

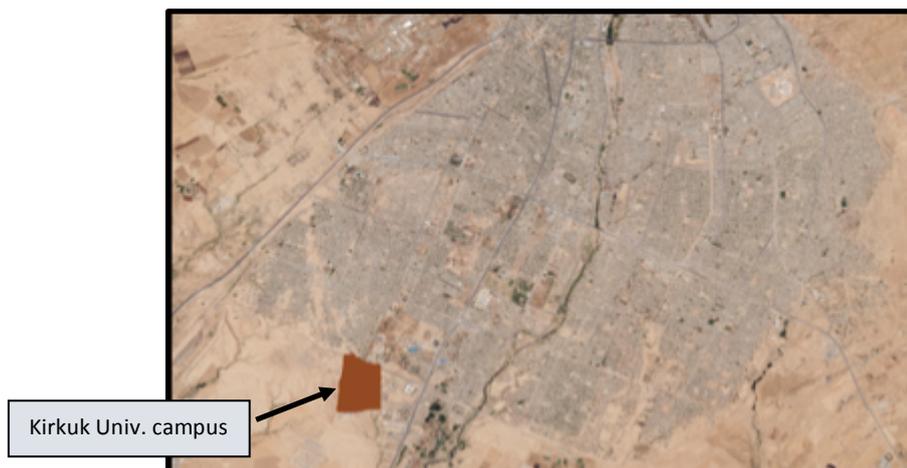


Figure 1a: Campus location within (Kirkuk) city; source: Google earth edited by authors

3. RESULTS AND DISCUSSIONS

Findings resulted by this study addressed several issues of campus design related to the performance of physical outdoor setting, as follows:

3.1 Structural layout

Structural layout is one of the essential elements forming campus physical character. Issues such as accessibility, circulation as well as relationships between key areas on campus are formed according to the layout, which therefore affects the pattern of life (Abd-Razak *et al.*, 2011). Accordingly, layout is influential in campus performance as an environment accommodating education, working, recreation and accommodation activities.

Structure of Kirkuk University campus layout has neither clear pattern of buildings arrangement nor circulation systems. Buildings are distributed in dispersed way occupying several locations of the campus. Near the main gate located at the northern side of the campus, the presidency and male housing exist. Some of academic buildings namely, engineering and education colleges are positioned in the eastern part, while the remaining academic buildings accommodating law and sciences colleges are located in the almost central part of the campus. Females' housing is placed in the southeastern area. Wide empty areas were left undeveloped between those areas. For paths layout, the dominance is for automotive ways over footpaths, in which campus areas are segregated from each other by vehicle streets impeding the continuity of pedestrian's circulation among these areas. No clear and independent walkway system can be distinguished, where footpaths are mostly extended along with vehicular tracks (See figure 1b). However, the design for pedestrian should take the greatest priority in campus planning process (Strange and Banning, 2001). Such setting has produced a dispersed and car-dominance based structure (Figure 2) that has implications on how compatible with users' needs the campus is and how satisfied with the environment the users are. This was reflected on the results of the quantitative study related to user's satisfaction with the outdoor environment in general, where the majority of the respondents at a percentage of 74% thought that campus design does not meet their needs. This result indicates that most campus users are dissatisfied with the current planning and design features of the campus, in general. For future development, building arrangement need to be based on grouping strategy that should consider creating sound contiguity relationships among buildings within each group creating positive and identified spaces between the buildings. In addition, roads that negatively affect walkers' circulation should be abandoned or transformed into pedestrian's ways.

It is valuable to know what causes students' dissatisfaction, which improvements would yield the greatest students' satisfaction, and that have the most importance to them. Based on users' point of view supported by visual survey, several design issues related to campus structural layout campus are discussed below.

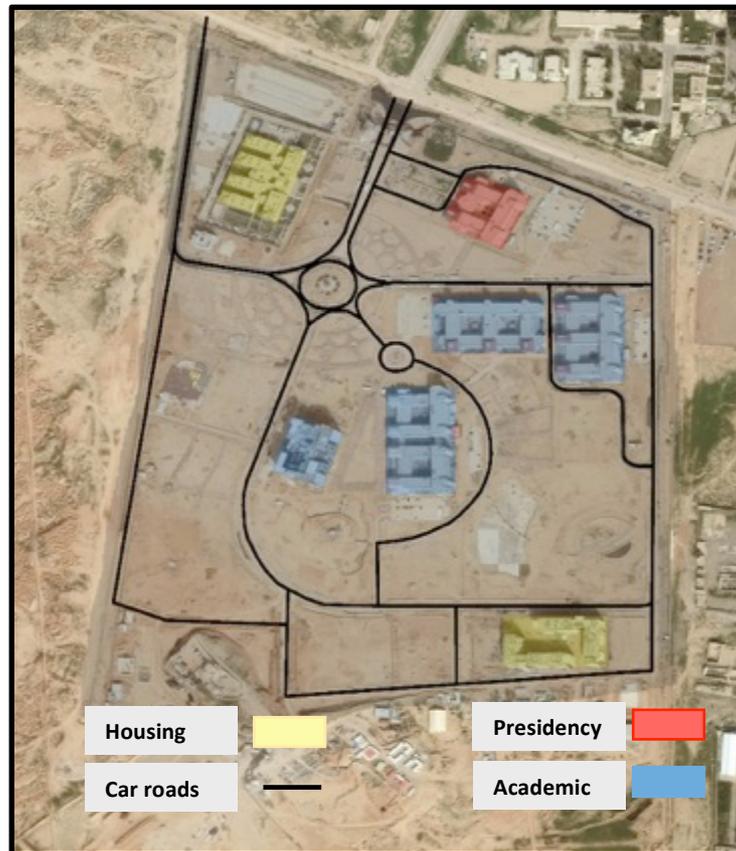


Figure 1b: Campus structural layout (building and routes); source: Google Earth edited by authors



Figure 2: Car dominance on campus

3.1.1 Accessibility and enclosure

Accessibility and enclosure are key urban design objectives related to structural layout. Accessibility

is be defined as the ease with which users can get their needs including services and activities (Litman, 2014). As all vehicles, whether own or public ones, students use to reach the university are not allowed to enter inside the campus, students' movement on foot has become the most important circulation to move between the main gate and academic buildings; so that students need to access their departments as easily as possible. Feedback on the accessibility indicated that 45% of the respondents considered the access to the academic buildings from the main gate is not easy, versus only 31% considered it easy (Figure 3). This result might be attributed to two aspects. The first is the dispersed way, in which campus structure has been configured, where the more scattered the campus form is, the more inaccessible the destinations on campus would be. The second is related to pedestrian's circulation issues, where the majority of the respondents expressed a difficulty of movement on campus in terms of different aspects (as will be discussed).

As for the structure of campus layout, to achieve better performance regarding accessibility, Kirkuk University campus needs to take advantage of compactness concept when applying future developments. Compact layout is one of the values that Wheeler (2004) deemed significant to the challenge of creating successful built environments, where it helps shorten distances travelled, follow an efficient use of land and increase enclosure of outdoor spaces. However, the related responses revealed a lack in the sense of enclosure, where the highest percentage of the questioned users with 65% said that they do not feel a sense of enclosure while being in the outdoor spaces (Refer to figure 3). This is caused by the nature of the relationships between buildings each other and between buildings and spaces; where there is no mature grouping of buildings currently exist and the relations between buildings are not conducive to create positive spaces. The majority of resulted outdoor spaces are not well shaped, defined or bounded by buildings or even other elements such as trees; figure (4-a) shows an example of such spaces. Enclosure is an important quality of open space that needs a clear definition with no ambiguity related to its boundaries and shape. In this way, the space would own a clear character and function having the ability to create a sense of position, identity, enjoyment and satisfaction (Alexander *et al.*, 1977, Cullen, 1971). Without providing adequate sense of enclosure, students and other campus users would be undesired to use, stay in or enjoy the campus outdoor spaces, which would weaken campus performance.

However, a group of courtyards within academic buildings was found. Those spaces are well surrounded and defined by building masses contributing to an extent of enclosure and containment. Such setting has made the courtyards vital and sound places for several of students' activities such as relaxation, eating, drinking, reading, study or merely spending break periods (See figure 4-b). Therefore, it is useful to keep using the strategy of courtyard within academic buildings for future developments, as this would contribute to better performance of the campus.

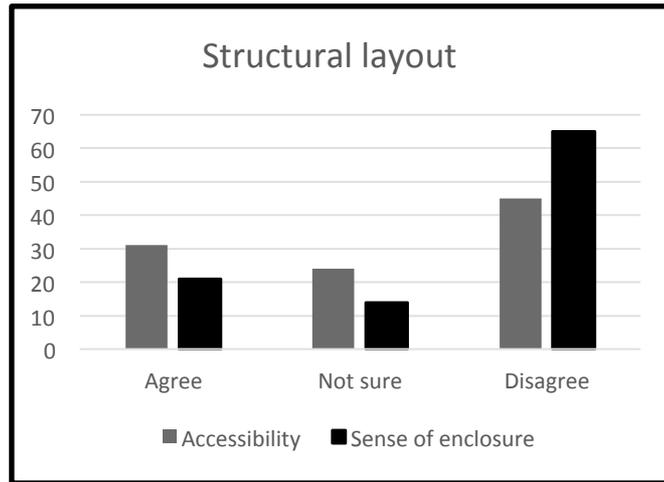


Figure 3: Feedback on structural layout issues



Figure 4: Spaces and enclosure

Moreover, the future development and adding new buildings need to be under the approach of compact arrangement dealing with campus open-air spaces as outdoor rooms. Compactness strategy is more likely to create a desired sense of enclosure, integrated urban structure, security, comfort feelings in addition to the environmental benefits. The compact building structure, on the other hand, has the potential to create more opportunities for people to walk as well as enables students to change classes within the ten-minute break (Chen *et al.*, 2008). Building density on the campus needs to take a great consideration, where density represented by (FAR) should not be less than 1/1 for university campuses (Al-Kilidar, 2006). Higher density of campus building is regarded a fundamental factor to support pedestrian-access to facilities and services needed and increase a sense of enclosure (Talen, 2011, Williams, 1999). A strategy of “infill” development is an effective way to limit the expansion towards outside and increase density of the existing built areas, thus creating a more compact campus structure with enhanced accessibility and

enclosure. This strategy is revealed by Wheeler (2004), which seems perfect for the studied campus, as there are many undeveloped plots near and around the existing buildings. Such areas can be successfully invested by establishing new buildings of an architectural style harmonious to that of the existing ones of each area. Graphic presentation of (Figure-ground) theory is a useful means to evaluate or manipulate building density and enclosure on campus; this should rely upon considering urban space as the positive component, while buildings as merely edges of the space. New buildings, accordingly, would contribute to restructuring the urban form creating cohesive and converged built areas with enhanced enclosure, which can in turn, support accessibility and the effective use of outdoor spaces on the campus.

Campus accessibility is also affected by circulation conditions that play an indispensable role in how easy the travel of pedestrian is. Examining the ease of movement is required in this context, which included issues such as the protection from the elements (sun and rain), providing safe walking and footpath character. Feedback recorded a higher ratio with 53% of the respondents who considered the protection from weather as (bad), as illustrated in figure (7). This result is compatible with the observation survey results, where pedestrian's network is lacking covered walkways and canopies of street trees (Figure 5) , resulting in a non-shadowed and unprotected walking (Observation survey). With a climate such that of Iraq characterized by a hot, sunny and dry atmosphere in summer and cold rainy in winter (Al-Shalash, 1966), unprotected footpaths act as a real obstacle for pedestrian to reach their destinations easily. This situation affects accessibility and discourages people to walk. However, some arcades in front of academic buildings as parts of their facades were observed (See figure 6), which contribute to providing users with smooth, comfort and gradual transition between the indoor and outdoor. They also provide a protected movement among convergent buildings. Segar *et al.* (2009) concluded that arcade can form a comfortable area that calms the strictness of the boundary between the building and public realm. In addition, the visual study recorded few awnings freestanding in some front-yards of buildings. Although the low quality of their appearances, such elements are useful in creating protected sitting places that support students' needs, which in turn increases the performance of the campus outdoor environment (refer to figure 6). Such elements need to be encouraged, but in better quality, as they can increase space robustness that enables the effective use of the space for different uses, at different times (Mantrawadi, 2005, Bentley, 1985).

In order to support campus performance, means that are useful and efficient in the protection from weather should be an integral part of development design from outset, where an integrated network of covered or wooded walkways is necessarily required in the campus. Such a network can serve effectively in the sever climate to provide comfortable walking. This, in turn, supports campus accessibility and

encourages students to use walking rather than the vehicle contributing to a more walkable, healthier and quieter environment for learning as well as living.



Figure 5: Unprotected walkways impede accessibility and discourage walking



Figure 6: Arcades and awnings support comfortable use of the outdoor spaces

Providing safe movement for walkers is an essential matter needed to create a walkable and successful environment. It is related to provide a safe and secure environment for campus users, especially students. The research has found that the current pedestrian's circulation design is not able to provide a sense of safety for people, where a higher ratio of 41% of the respondents said that the provision of safe and quiet walking is (bad) versus only 23% who recorded it as (good) (Refer to figure 7). According to the observation survey, there is a mix between pedestrian circulation and vehicular traffic (See figure 8). Footpath network is interrupted by vehicle streets in numerous points, without any manipulation for pedestrian crossing at these points, except some speed humps installed at few points. The layout has imposed car streets to penetrate most of campus areas separating academic buildings from each other. This has put obstacles on pedestrian's movement between those areas or buildings (Observation survey). In addition, most of footpaths are extended alongside roads with fully absence of landscape separating between walkway and car track. This setting has caused a sense of non-safe and annoying walk. To ensure better performance in terms of pedestrian's experience, footpath network should be designed as an

independent and integrated system, separately from vehicle roads. This network should act as a skeleton of the campus and the principal liaison between its parts (UVic Campus Planning Committee, 2005). For walkways lying along vehicular roads, a landscape strip should be used to separate pedestrian from vehicle track in order to minimize the bad effects of motorized vehicles on walkers such as fear from accidents, noise, as well as visual and air pollution. Dober (1992), pointed out that paths must be safe, accessible and fit in with the environment as well as walkers should be shielded in some way from vehicular traffic.

Touch points between pedestrian and roads need to be designed as safe and comfortable crossing areas. Wherever they encounter on campus, pedestrian system should take the priority before vehicular system and the encounter points are to be manipulated in the way that pedestrian can cross street easily and safely. One of the effective devices used for this purpose is 'raised crosswalk' at a wide corresponding with pedestrian flow. The use of this device that provides accessible and convenient crossing helps calming traffic speed and offers a clear sign to pedestrians intending to cross the street. Different colors and textures can be used to highlight crossing zones alerting walkers to these spots.

Footpath character is an important quality for a successful pedestrian network. This includes the quality of footpath surface and paving. The majority of respondents rated this quality as (bad) with a ratio of 52% (Refer to figure 7). This result is consistent with the results of the qualitative study, where several related problems were detected. The most important issue is represented by the uneven surface of some footpaths on the campus, where the paving has taken a convex surface, as shown in figure (9), causing a difficulty and instability in walking. In addition, campus pavements were lacking in maintenance in several parts of the network, where some spots of broken surface and paving cutoff were noticed (Observation survey). Such issues affect the ease of movement and, then, the accessibility on campus. The emphasis when designing a campus should be on creating an integrated campus in which all parts relate to each other by a well designed footpath system and of good quality. The continuity of movement paths is necessary to ensure easy travel on campus, as Litman (2003) asserted. More attention needs to be paid to paving surface as one of the pedestrians' amenities, which affects several aspects related to campus performance such as comfort, accessibility, attractiveness, legibility, distinctiveness and so on (Parr *et al.*, 2011, Irvin, 2007, Segar *et al.*, 2009). Thus, the campus needs to take into account the character of its walkway network in terms of surface and paving quality so that encourages users to use it. This includes the provision of walkways of high quality, fully flat and obstacles-free surfaces.

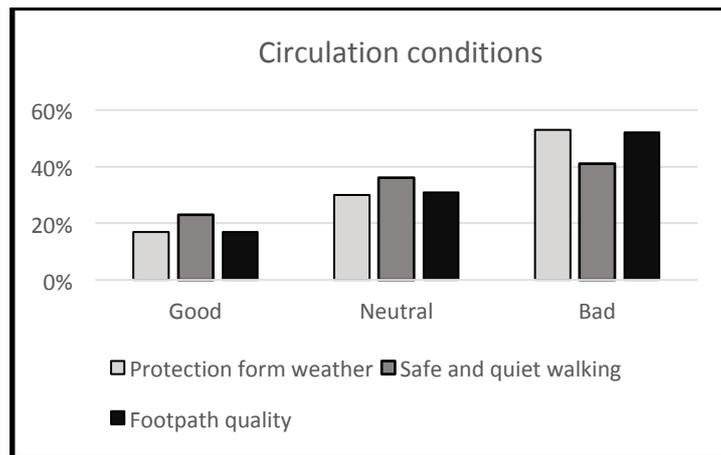


Figure 7: Feedback on ease of movement issues



Figure 8: Mix between pedestrian and vehicle circulation decreases safety and disturb walkers



Figure 9: Uneven (convex) walkway surface causes a difficulty of walking

3.1.2 Legibility

Legibility is a design objective that determines whether an environment is easy to read and appropriate to direct people to where they wish to go easily (Salama, 2008). Results of the quantitative study revealed that the majority with 69% of the respondents said that the layout of the campus doesn't

confuse them (Figure 10). This result might be attributed to the small number of the buildings that currently exist in the campus. However, the campus design is suffering from some design issues that contribute to less legibility and weaker campus image. One of these is related to movement systems design, whether for pedestrians or vehicles. The absence of a clear hierarchy in path networks particularly that for pedestrian is a critical problem that decreases way finding on campus. It was observed that no main paths connecting the important parts of the campus exist, where most paths are similar in their appearance and characteristics (Observation survey). Path hierarchy is a fundamental component of campus physical character, which determines how clear and understandable the environment is. Lynch (1960) deemed insuring a good hierarchy of path network contributes to strengthening the image of the built environment, as it is related to providing a sense of circulation system order. The campus, therefore, needs to enhance its path system for both pedestrian and vehicles through creating a clear network for each. For future enhancement, circulation network should be designed starting by main paths that should be wider and tie the key areas of the campus. From the main tracks, narrower secondary branches are extended to different places and buildings. The design of each path in the network should take into account its relative importance in the system as a whole. Main tracks for example, need to be strengthened by landmarks, nodes, covering and trees as well as by buildings of central and public functions. According to Dober (1992), hierarchy of use should be considered; central nerve paths should be as efficient as possible, while secondary or tertiary paths can be more winding and less wide.

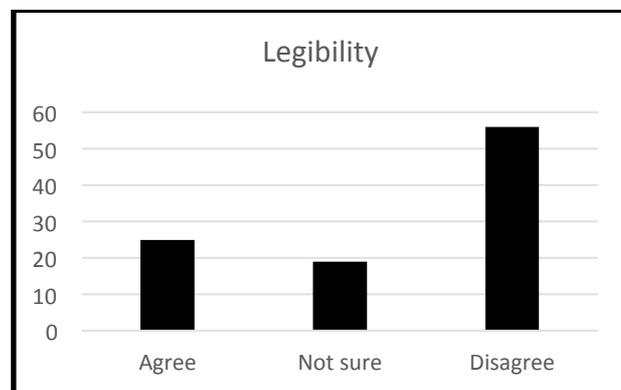


Figure 10: Feedback on whether campus layout confuses users

3.2 Buildings

Buildings are the one of the key components of a campus physical character (Dober, 1992) and can play an indispensable role in supporting the performance of university campus. Buildings architectural style is on significant characteristics related to campus character and distinctiveness. Feedback on buildings appearances recorded the highest result at 48% of the respondents who stated that campus

buildings do not express a unique character for each, while only 15% thought the opposite (refer to figure 14). This result is related to architectural style, where most of campus buildings have similar forms and façade designs. The similarity was observed present even in the case of different functions of some buildings; for example, the residency building is similar in the exterior appearance to some academic buildings (Figure 12). This setting resulted in that buildings cannot show their own identity, which in turn, yielded a less imagable, boring and less interesting environment. Although unity through similarities is required to create a coherent environment, maintaining, a deal of diversity is necessary to support the various disciplinary areas and microcultures that exist on campus (Shamsuddin *et al.*, 2007). Nevertheless, some buildings of different exterior designs and forms were observed in the campus. However, in some cases, the full difference with the semi- absence of unifying elements with the typical style dominant on the campus (See figure 13) could contribute to visual confusion and weaken campus cohesion, which also affect campus identity. Features such as arcades, roof shape, louvers, sun devices or openings treatments proportions as well as materials or even colors can serve as unifying elements between buildings of different architectural styles.

Thus, for prospective development, the campus should consider diverse architectural style for its buildings or groups of buildings in order to enhance own identity, yield strong character for each and create diverse environment on campus. However, this does not mean neglecting the characteristics of unity and cohesion in buildings designs, where maintaining a balance between unity and diversity is the optimum situation required.



Figure 12: Similarity of buildings architectural



Figure 13: Absence of unifying elements in the architectural style of the opposite buildings forming the central space of the campus.

The other characteristic is building entrance that is important for a building character affecting the image of the campus as a whole. From users' points of view, results regarding whether buildings entrances are easy to find recorded equal percentages between those who rated it as (good) and those who considered it (bad) (refer to figure 14). Nevertheless, the qualitative study disclosed an ambiguity in easily finding the entrances of several buildings. This might refer to façade design properties, where the typical design of academic buildings contains, several similar elements, each can be read as the building entrance, but in fact, only one functions as the entrance of the building (Figure 15). This setting might mislead and confuse users making it not easy to find the entrance. The entrance is an essential part that leads people to the building's access point and can provide visual and compositional balance to a building façade. It is also argued that the emphasis on entrance design enables people to read the building façade well and facilitates the transition from outside to inside or from public to private realm (Sasaki-Associates, 2010, Carmona, 2010). Therefore, Building designers should take into consideration characteristics such as clarity and welcoming when designing the entrances of campus buildings, particularly academic ones. Highlighting the main entry point can be done by manipulating it in the way different from that for other parts of the façade. According to Hanan (2013), the use of recessed entrance or that of overhang part can create a layered and interactive touch between the building and the public realm as well as increase the indication of the entrance. In addition, installing some landscape elements such as trees, shrubs, flower beds, fountains, artworks or seats near building entrance lends a sense of welcoming and invites people to enter. It also provides an opportunity for one to wait, stand, talk or even sit near the building comfortably. An implementation of using some features related to the focus on building entrance was observed near the entrance of the presidency building, where green front yards and two rows of shrubs are surrounding the walkway that leads to the entrance, which gives a strong sense of welcoming as well, (See figure 16).

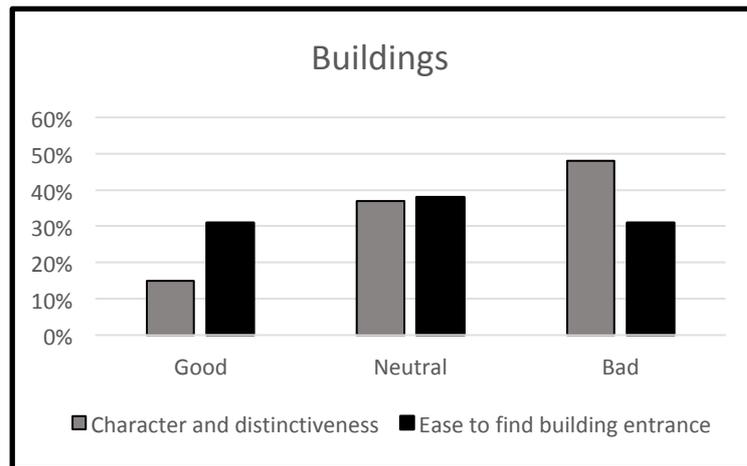


Figure 14: Feedback on building characteristics



Figure 15: The multiplicity of elements that are read as entrance confuses users



Figure 16: Landscape in front of the entrance increases identification of the entrance and sense of welcoming (presidency building)

3.3 Landscape

Landscaping is a principal physical component of urban design. It is related to 'greening concept' whose purpose is to make connections between people and nature by bringing nature into the urban areas through a variety of elements and features. Whether soft or hard landscape, it can play a critical role in

supporting campus performance as it can affect several issues related to comfort, wayfinding and space definition (Jabareen, 2006, Elkin *et al.*, 1991, Walker and McGough, 1962).

3.3.1 *Soft landscape*

For the availability of natural elements such as trees, shrubs, green fences, flowers or water features, 69% of the respondents rated such features as (inadequate) versus only 5% who chose (adequate) response. This high proportion of respondents also thought that soft landscape elements do not contribute to making the campus comfortable or attractive place. In addition, the majority of respondents with 72% revealed that the provision of green areas (areas planted with grass) is (inadequate) (figure 20). The qualitative study came compatible with these results, where a severe shortage in areas with green cover, trees, green fences and other species of plants as well as water features was recorded. Although there are lot of open areas, but most of them are not well furnished by landscape or undeveloped (Figure 17). However, there is an attempt for afforestation and greening in some areas on the campus, but it is inadequate. In addition, this attempt has been suffering from some negatives: firstly, trees planted are very small that need a long time to be able to serve effectively. Secondly, plants used do not take the required care and maintenance yielding a poor landscape (See figure 18). Maintenance of landscape is one of the attributes of successful open space as it can influence aspects related to campus performance such as visual attractiveness, effective use of open space, walkability and sense of welcoming (Segar *et al.*, 2009, Carmona, 2010). It cannot be argued that most negatives of the current situation related to landscape is a result of the fact that not all construction phases of the campus has completed yet. This is because landscape scheme should be an integral part of campus design and its implementation should begin earlier in tandem with the beginning of construction process, particularly, the campus was opened and operated several years ago.

However, small plots near some academic buildings and some courtyards has been equipped with landscape elements including trees and other plants as well as some water features (Figure 19), but such areas are not enough to give the required effect of landscape on the campus as a whole. Nevertheless, such areas act as visual and activity nodes that are used effectively by most of campus users. As a result, the shortage of soft landscape affected negatively visual attractiveness and the function of the campus. As for visual aspects, respondents with the highest percentage of over 70% thought that the outdoor environment of the campus is neither visually enjoyable nor interesting (Refer to figure 20). Quality of views and vistas is an influential factor in improving campus performance, where the enhanced scenes are valuable visual attractions for campus users (Chan *et al.*, 2009). These, in turn, can encourage students to use the open spaces more effectively providing a sound environment for better learning process and other related

activities. Trees, for example, can play a fundamental role in improving views and vistas, which act as a frame for particular vistas, hide and screen undesirable views or poor-quality architecture and serve as a means to fill in leftover spaces of the outdoor environment (Carmona, 2010, Parsons and Daniel, 2002, Abbaszadeh, 2011).



Figure 17: Wide open areas with absence of soft landscape



Figure 18: Negatives of greening process resulted in a poor landscape



Figure 19: Courtyards and front yards equipped with landscape act as places for visual and functional attractiveness on campus

The lack of landscape on campus could have a direct impact on the quality of life, which in turn, has bad consequences on the learning process in the campus. This was revealed by the quantitative study, where 51% versus only 16% of the questioned students believed that the current landscape setting could not aid the educational process ongoing in the campus. This might be attributed to the potential of the outdoor spaces to provide users with an adequate sense of comfort, which was captured from the responses of the highest proportion of the questioned users at 65% who do not feel comfortable while being in the outdoor spaces (See figure 20). Users also disclosed other main reason of being dissatisfied with landscape when 75% of the questioned users disagreed with the sufficiency of the spaces allocated for entertainment activities (Figure 20). The provision of adequate and well-designed green spaces and soft landscape features contributes to creating shaded and comfortable places student need to relief study stress, enjoy, interact or read as well as enhancing the visual experience of campus users. These qualities, in turn, can formulate an important part of learning environment and provide a valuable aid for the educational process on campus. The campus needs to adopt the idea of ‘campus as arboretum’ that arose as a design concept to support visual attractiveness and other qualities on campus. It depends on using a rich mix of plants consisting of both native and exotic species in the campus outdoor environment

(UCIRVINE, 2010). This concept contributes to support diversity of landscape materials that enriches views and vistas towards enjoyable and interesting learning and relaxing environment. Green spaces should be present everywhere on the campus, which need to be designed well to accommodate various activities of campus users. It was concluded by Strange and Banning (2001) and Chapman (2006) that the presence of well-designed green spaces is an essential matter for a campus community as this type of spaces can enliven campus life and play an indispensable role in creating a better learning environment.

Designers should pay a greater attention to provide trees adequately on campus. Providing suitable types of trees for different purposes and functions is a critical matter in order of a successful greening process. Trees have significant benefits related to support human health such as air purification from dust, absorbing carbon dioxide and releasing oxygen, which enhance the quality of air. On the other hand, plants and water features have an undeniable benefit in controlling the high weather temperature in the outdoor environment through the evaporation process and provision of shade. It can also calm strong hot winds, which contribute to improving the thermal comfort for campus users (Jenks and Jones, 2009, Harris and Dines, 1998). Street trees are to be a significant component of campus green structure, where they are necessary in insuring a comfortable walking, enhanced vistas and better wayfinding as well.

In short, such qualities of soft landscape are necessarily to be ensured in this campus in order to diminish the sever effects of the climate of this country, Iraq, that is characterize as hot dry dusty in summer and cold rainy in winter. Therefore, the campus should pay enough attention to provide adequate green spaces, trees and other plants as well as water elements and design them based on themes or a unique concept as an integrated green structure.

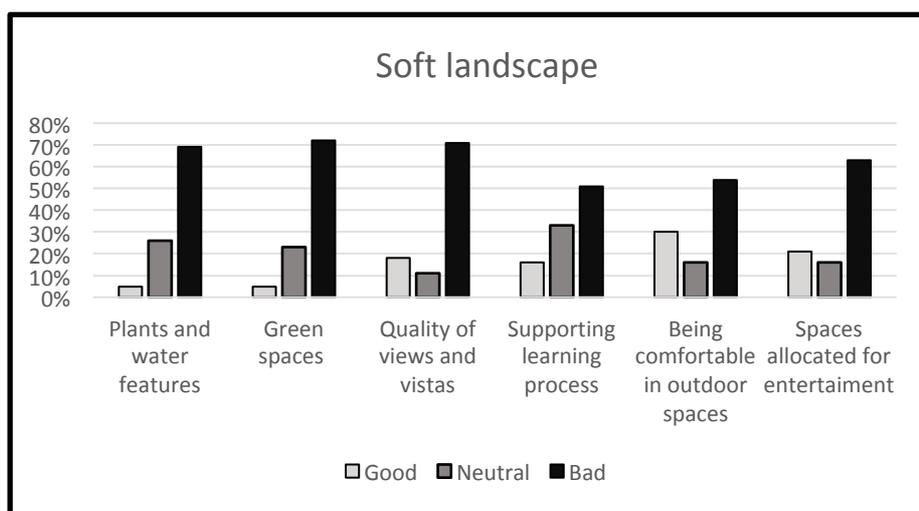


Figure 20: Feedback on soft landscape features

3.3.2 *Hard landscape*

Hard landscape is the other component of landscape character in urban areas including campuses, which have importance in supporting issues related to campus performance such as comfort, attractiveness and legibility. The research has assessed three important features of hard landscape on the campus. Starting with signage, feedback recorded a lack in the provision of campus signs, where the highest percentage at 61% of the respondents rated it as (inadequate) (see figure 23).

Such a lack was asserted by the observation study too, where no signage system was noticed on the campus, except buildings boards. This makes it difficult for people to easily find directions and the absence of traffic signs causes a shortage in safety while crossing roads. Providing adequate signs including traffic ones with good design and quality ensures a clearer image of the environment and enhances wayfinding, particularly for new comers (Strange and Banning, 2001, Davies, 2007, Ja'afar *et al.*, 2012). Signage system of university campus consists of several types such as signs that direct people to various destinations, identification signs of buildings and parking lots, campus map boards as well as traffic signs. Thus, an integrated signage system is crucially to be provided on the campus in order to raise the quality of life regarding wayfinding and safety on the campus.

Seating elements are a part of street and site furniture those are closest related to human physical comfort in campus open space. Seating provision recorded a low rate according to students' point of view, where the majority of the students at 45% rated it as (bad) (Figure 23). This was also proved by the visual survey disclosing a problem related to people comfort on campus. The survey pointed to a lack in seats and benches in open spaces or along walkways. Nevertheless, benches placed in some courtyards as well as within some buildings front yards exist, which conduce to effective use for these spaces (see figure 21). Green spaces and walkways on campus need to be adequately provided with comfortable sitting elements that would support physical comfort that ,in turn, according to what Carmona (2010) concluded, encourages people to use these spaces more frequently and yields more opportunities of social interaction.

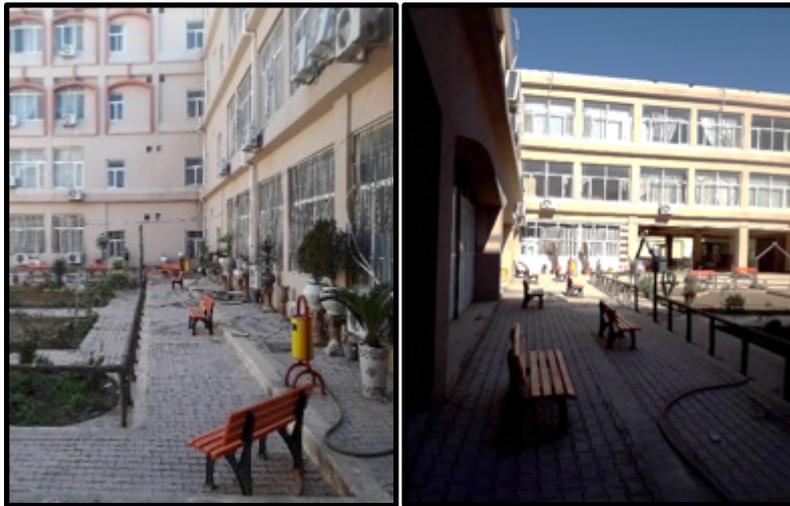


Figure 21: Availability of seats in some open spaces provides users with comfort enabling to use the space for longer time

Similarly, results related to artworks and sculptures showed a real problem where the highest percentage of the respondents of 68% said that artworks on the campus are (inadequate) (Figure 23). A semi absence of artworks or monuments in the outdoor campus was also detected by the visual survey, except only a sculpture positioned in the square formed by the intersection of the main roads on the campus. However, this sculpture does not reveal a clear meaning nor convey certain message for viewers (see figure 22). Based on these results, the campus needs to pay more attention to provide a sufficient number of high meaningful artworks in campus outdoor spaces. Such elements can contribute to support a sense of place as well as create attractive and distinctive environment on the campus. This is consistent with the opinion of DETR and CABE (2000) that sculptures and artworks are important physical elements that can play a great role to improve the outdoor space as an attractive environment and have the ability to strengthen a place's identity. For future development, the campus needs to install a group of sculptures that are carefully chosen in themes in the form of fountains or merely freestanding artworks put at the important places of the campus such as path junctions, collecting spaces, courtyards, entrances and so forth.



Figure 22: The only sculpture on the campus does not carry a clear theme

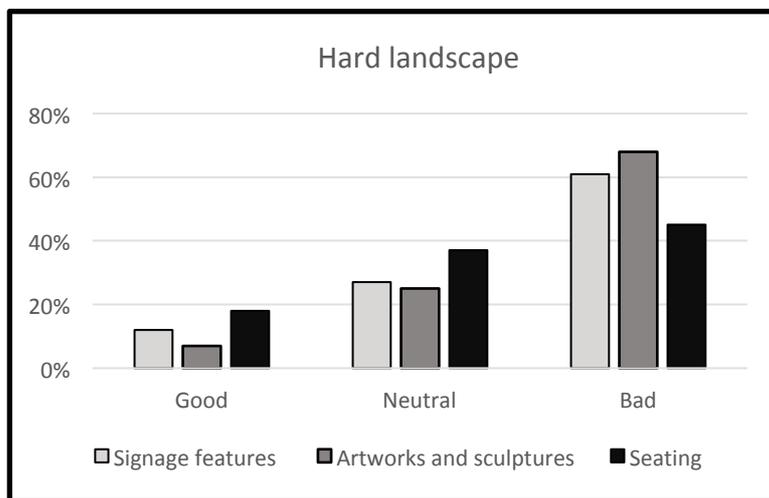


Figure 23: The only sculpture on the campus does not carry a clear theme

To conclude, landscape including soft and hard elements is required to be present as a part of the campus physical character as it is influential in enhancing the performance of the campus in terms of several aspects. Designers of future development should deal with landscape as a fundamental component of the coming scheme. Any inattention of landscape may affect negatively the campus community's quality of life and reduce the performance of the outdoor space as a medium of effective learning.

4. CONCLUSION

This research has dealt with issues related to the performance of the outdoor spaces of the campus of (Kirkuk university-Iraq) as a learning environment and put insights for future developments. Results showed that there are weaknesses in the design features of the main components of campus physical character.

As for structural layout, the dispersed way in which buildings were arranged has impacts on campus accessibility and enclosure. Most of resulted open spaces are negative because they have neither identifying edges nor specific shapes. A compact building configuration using the “infill” strategy needs to be followed in the future development, which would ease the accessibility and create an enhanced sense of enclosure. Designers should keep using the concept of courtyards within academic buildings as they act as preferred places and activity nodes for most students. The study also concluded that there are negatives in issues related to the design of pedestrian’s circulation such as protection from weather, safety and walkways quality, which also influence accessibility and user comfort on campus. In order to create a walkable campus, footpath network should be as a spine of the campus and given the priority before automobile roads. A clear hierarchy in walkway network design is needed to ensure a clearer environment, better wayfinding and stronger sense of order. Covered walkways should necessarily be present at least on the main segments of the network to provide a sheltered walking and easier accessibility. It was found that the network of vehicle roads is separating campus areas from each other. Therefore, automotive traffic that penetrates academic areas and intersects with pedestrians’ movement should be abandoned.

Findings showed that the similarity between most building designs on campus affected characteristics related to campus identity such as diversity and distinctiveness, which weakened campus character. Building design on campus needs to ensure a balance between unity and diversity. While unity features are needed to create a cohesion environment on the campus, diversity is useful to ensure a varied and vital building on campus. In addition, the design of building entrance should take more focus by giving it a unique design in the building façade in order to make it easy to find the entry point and strengthen building character. Installing landscape elements near building entrance can introduce an enhanced sense of welcoming and clearer entry. In the case of using different architectural styles, unifying elements need to be used to avoid missing the unity and cohesion. It was found that the use of arcades as a part of building façade is a positive point as they deliver protection from weather for walking around and provide a calm transition between the inside and outside.

The study also found that landscape is significant as a complement element for building structure. The lack of soft landscape and green spaces influenced visual and activity issues on the campus. Campus developers need to pay greater attention to provide adequate elements of plants and water features in order to improve views and vistas, enhance microclimate, provide comfortable walking and support activities in outdoor spaces. The use of the concept of “campus as arboretum” is critically needed for the studied campus to optimally implement the “greening” principle. In addition, hard landscape elements such as seats, artworks and signage were found significant in supporting issues such as identity, comfort and quality of life on campus. Seats can offer convenient and effective use of campus outdoor spaces enabling the use of the space for longer periods. The provision of sufficient and carefully designed sculptures and artworks helps support campus character and convey valuable messages to the users. Findings also highlighted the importance of presenting an integrated signage system to support campus legibility and wayfinding as well as a sense of place.

It can be concluded that urban design characteristics can play a big role in influencing campus performance as a learning, living and working environment. Enhancing the campus performance needs to be the main aim of future development. In order of successfully meeting this goal, developments should draw upon a carefully done assessment of the studied area. The research strongly recommends that the main two urban design principles those are critically needed for developing this campus are: compactness and greening. This is compatible with the local climate, and traditional architecture of the country. It is also coincided with the views of other researchers such as Burton (2000), Burns (2001), Steffen (2008), Santana *et al.* (2009) and Jabareen (2006), Carmona (2010) and Jenks *et al.* (1996).

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