Establishing a Greenway Network for University Campus
A Case Study at Universiti Teknologi Malaysia

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Abstract

Greenway is a route to connect people with places. It is a multi-objective planning approach in order to alleviate the quality of campus environment as well as its identity as an academic village. In the university campus, the greenway provides spaces for campus users to perform outdoor activities such as jogging, walking and biking in the pleasant environment. Thus, a campus greenway is composed of treed streets, pedestrian way, cycle way and river or lake corridors connecting play fields, gardens and squares. To establish a greenway in university campus, road reserve is used as a main linear resource that has a ready network of a linear corridor. The road reserve is also can be used as a campus greenway to function as a space connector, alternative route and communal space. Inasmuch, the foremost challenge in establishing a campus greenway is to encounter the fragmentation of each physical element such as walkway and trees along the road reserve. This study analyzed the physical characteristics of each linear (walkway) and non-linear element (trees and nodes) which constitute a greenway in a university campus. The study has measured the variables such as connectivity, naturalness and nodes within and along the campus road reserve. The study has conducted site inventory and observation by using a checklist table and site photograph. All the data collected then were inserted into a GIS by using ArcGIS 9 (ArcMAP release version 9.1) to be systematically visualized and analyzed. Thus, the study has identified the factors affecting a current formation of campus greenway were (1) too narrow road reserve and (2) too many gaps (breaks) and barriers obstructing the flow of pedestrians or cyclists to travel along the greenway. The gaps were road junctions, opened drains and discontinuous walkway, and the barriers were signage boards and lighting poles improperly located on walkways. The study implies that establishing the greenway in campus should consider every elements and its various forms and functions were intimately connected.

Key words: Greenway, Space Connector, Alternative Route, Communal Space, GIS

1.0 INTRODUCTION

Campus is a unique place with a distinctive community with green spaces such as streets, squares, amphitheaters, courtyards, small gardens and lakes. It also accommodates buildings such as student centers, offices, halls, childcare facilities, shops and sports arena (Balsas, 2003). Buildings and roads are essential infrastructure to ensure safety, security and comfort to the campus users. Inasmuch, greenway also plays a crucial role for healthy and responsive working and learning environment. Thus, the greenway networks are a strategic tool to encounter these issues. Greenway network is greenery and interconnected linear open spaces formed by treed streets, waterways and drainage ways around and between urban areas, at all spatial scales (Gobster and Westphal, 2004) where people can use it to reach places of work or study (Toccolini et al., 2004). It connects people and places (Fabos, 1995). Campus greenway runs parallel to the road reserves as a main resource for a linear corridor that forms the campus road system. A well shaded and connected greenway in campus is constituted by the walkway, cycle way, jogging path and the line of trees.
Inasmuch, greenway plays a crucial role for healthy and responsive working and learning environment.

2.0 CASE STUDY – UNIVERSITI TEKNOLOGI MALAYSIA (UTM)

Spatial zoning in UTM can be divided into five layers: Knowledge Radial Zone, Inner Radial Zone, Outer Radial Zone, Open Space Zone and Protocol Road Zone (Figure 2.0). The most inner layer which called Knowledge Radial Zone is the campus core area forming the centralized campus form. It is consisted of faculty, administration building, library, post-office, banks, book store and cafeteria. This zone is connected to the surrounding areas by the 12m width ring road. The first outer layer of the spatial zoning is extended from the central campus core area, dominated by the residential college and faculty and connected by the radial roads which is called the Inner Radial Zone. The second outer layer Inner Radial Zone is comprised of residential college and located much more far away from the campus core area and the possible connection is by the road network. The Open Space Zone is defined by the campus forest reserve and lake area and also connected to others zone only by the road network. It is the most isolated and fragmented area in the campus and finally, is the Protocol Road Zone which is spatially linear approaching the campus as a main entrance.

This paper presents the selected route based on the spatial zoning that found in the UTM campus namely administration zone (ring road), main entrance zone, residential college zone, faculty zone and lake zone (lake corridor) (Figure 2.1).

3.0 METHOD

In this study, the selected route map was prepared based on the land use in the campus and the site inventory was carried out in which the checklist table was the tool used to record each individual linear and non-linear element which constitutes the greenway network in campus. The elements were walkway and its attributes (availability and width), fragmentary elements which occurred on the walkway such as signages, lighting poles, opened drains and road junctions, trees and its attributes (shape, planting interval and composition) as well as nodes that occurred along the greenway such as bus stop, cafeteria or games courts. Later, all the data collected were inserted into the GIS by using the ArcGIS 9 (ArcMap release version 9.1). The composite analysis was carried out for each selected route (ring road, main entrance, residential college, faculty and lake). Each route has been divided into each different segment according to its different characteristics. The greenway was divided into five routes according to different spatial zoning namely: (i) ring road (route A): main circulation route in the campus forming a campus core area comprises of administration building, bank, post-office, cafeteria, mosque, faculty and convocation hall, (ii) main entrance (route B): a main gateway for entering the campus. Its characterized by the new gate and old gate and a garden and mini zoo located along the roadside corridor, (iii)
residential college (route C): an accommodation for male and female students with the facilities such as cafeteria, games court and play field, (iv) faculty (route D) and (v) lake corridor (route E) (Figure 3.0). Each route with a different layer was analyzed according to four attributes (1) physical characteristics of walkway, (2) fragmentary elements such as road junction, drain, signage board and lighting pole, (3) tree characteristics in term of it shape and planting continuity, and (4) nodes such as shelter, bus stop, car park, cafeteria, games court, building courtyard and garden. All elements should be stitched together to provide a sense of connectedness for the greenway to become successful.

4.0 RESULTS AND DISCUSSION

Greenway should be ideally uninterrupted because linkage is a key. However, a greenway network in UTM campus was suffered from the disconnected and unbalances walkway provision, discontinuity of tree shades, improperly located of street furniture such as signages and lighting poles as well as too many opened drains and road junctions with no road crossing facilities. Thus, this study revealed that the factors affecting the successfullness of greenway characteristics in UTM campus were too narrow road reserve which hindering the provision of continuous walkway and planting strip and too many breaks and obstacles. For the purpose of this paper, only the ring road greenway and two elements (walkway and fragmentary elements) is discussed. Thus, as can be seen in Figure 4.0, by using the spatial analysis function of GIS, the composite map of ring road greenway was constructed. The composite map shows that the linear and non-linear element which characterized the UTM campus greenway was poorly developed.

Figure 3.0: The selected route for greenway in UTM campus based on its land use zoning.

Figure 4.0: Composite map of the ring road greenway.

4.1 Walkway

As shown in Figure 4.1, the 1.5m width of walkway was widely found in segments A1 (100%) and A7 (100%) whereas 1.0m width of walkway was mostly found in segments A3 (100%) and A5 (100%). It also can be seen that there was no provision of 1.5m width of walkway in segments A3 and A5 suggesting that there was missing sections of the 1.5m width walkway network. The same situation was also found in segments A1, A6 and A7 whereas there were no provisions of 1.0m of walkway width. Thus, the result suggests that there was imbalance provision of walkway in the ring road as well as the inconsistency width of the walkway. This has resulted to uncomfortable walking environment for people in the ring road greenway due to the lack of walkway connectivity and continuity. In conclusion, the ring road was not a successful greenway that failed to connect campus users to move from one space to another with convenient. It means that UTM's walkway system in its campus greenway was severely disconnected and discontinuous.
4.2 Fragmentary Elements

Figure 4.2 illustrates that road junction was the main breaks (12 nos) whereas lighting poles (11 nos) were the main obstacles which obstructed the flow of movement on the 1.0m width walkway in the ring road greenway. Road junctions were the main break in the segment A3 (5 nos) as well as opened drains (6 nos). On the other hand, segment A4 was most obstructed by the lighting poles (5 nos). It was also can be seen that the fragmentary elements were not found in segments A1, A6 and A7 due to unavailability of 1.0m width of the walkway in it. The result suggests that walking experience in segments A1 to A7 were unsafe and discomfort due to many breaks and obstacles which caused by the lighting poles, road junctions and opened drains. Road junctions and opened drains affect safety and comfort for the walkers. Thus, they should be equipped with a permeable element such as covered drains and road crossing or pedestrian traffic light.

Campus greenway has a capability to connect every space in the campus. Good connections are important for the greenway to ensure campus residents have the opportunities to get close to nature where they live, work, study or play. It also takes into account the balance between the need for campus development or expansion and the preservation of green spaces. It can be understood that the connectivity is important characteristics for establishing a multifunctional campus greenway that successfully serves as space connector, alternative route and communal space. Therefore, in order to achieve the connectivity for the network, every gaps and barriers must be reduced or eliminated. The main outcomes of this paper are: (a) campus greenway is an important planning tool for encountering space fragmentation due to campus expansion and (b) the development of campus greenway must ensure that every single element must be connected and tied together because linkage is a key characteristic for the successful greenway. Through these outcomes, this paper has demonstrated that campus greenway is a path towards connecting landscape with people in a pedestrian friendly campus environment.

References


