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### **Evaluation of King Saud University Master Planning Experiment: Lessons to Be Learned**

#### **Abstract:**

King Saud University (KSU) is considered the oldest university in the Kingdom of Saudi Arabia. The area of its Campus is about 9 km<sup>2</sup>. Since the 1980s, when the first Master Plan (MP) was completed, it has out grown the planned capacity to a total of over 40,000 students and over 5000 faculty and staff members. In (2009), therefore, KSU decided to update campus Master Plan (MP). That is to position the University to realize its strategic vision for the future.

During the last decade (KSU) has made many inputs on the campus such as constructing new buildings and roads to meet the increasing numbers of students and staff. This experiment has faced many problems and challenges, though many obstacles were overcome, from which several lessons can be learned by other universities. This paper examines the new master plan with the period between the two master plans and draws the lessons which can be learned.

**Keywords:** Planning, Master Plan, University.

#### **1. Introduction**

King Saud University (KSU), which is located in Riyadh, the capital city of the Kingdom, is Saudi Arabia's oldest and most prestigious university. It was established by King Saud bin Abdul Aziz as Riyadh University to meet the shortage of skilled workers in Saudi Arabia. In 1982, the university was renamed as King Saud University.

The original Master Plan (MP) started in 1974 with the construction of the loop road, with utility services completing in 1976. The University has served as a symbol of education in the Kingdom since the completion of its construction in 1984.

The current main campus, occupying about 900 hectares of land and. It was one of the world's largest construction projects designed by HOK Architects, headquartered in St. Louis, Missouri in 1975. The mechanical and electrical systems were designed by Syska Hennessy Group, Inc. New York City, New York.

Enrolment has almost reached its planned capacity doubling to over 40,000 students since the completion of the primary campus.

To accommodate the University's future needs and to maintain KSU competitiveness in student enrolment and age of the campus, it has become necessary to update the campus Master Plan<sup>1</sup>. This

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<sup>1</sup> As KSU approaches its half century of existence, it has been recognized the need to develop a campus master plan, in consultation with all interrelated entities. The basic premises of master planning is to show existing and anticipated facilities necessary to accommodate a specified enrollment at an estimated target date, in accordance with approved educational policies and objectives. In essence, the KSU master plan reflects the ultimate physical requirements of

will facilitate KSU's mission to meet the educational and development needs of society by providing high-quality academic programs, leading innovative research and creative articulation, and engaging effectively with the community for prosperous cultural and economic development of the country.

This paper has the following objectives:

- To shade a light up on the chronological evolution of KSU campus since the first version of campus Master Plan in 1974 until the updated second version in 2009.
- To pinpoint the lesson learned of such development.

In addition to introduction and conclusion this research, therefore is divided into three sections as follows:

1. Master Plan a review of literature
2. KSU Campus development phases
  - 2.1 Phase (1) first version Master Plan (1974)
  - 2.2 Phase (2) from 1<sup>st</sup> to 2<sup>nd</sup> version Master plan
  - 2.3 Phase (3) the second version Master Plan (2009)
3. Lessons to be learned

## **2. Campus Master Plan a review of literature**

Two terms has to be clarified "Campus" and "Master plan".

The term university campus refers to an institutional space that is designed for use in the education and residence of college students (Isiaka & Siong 2008) and includes the building and other physical elements found in the associated area. The establishment of the university campus usually occurs in stages according to its current needs for growth and development (Walker & McGough 1962). Existing university campuses require further development from time to time, based on the objectives that must be achieved. The physical development planning of a campus can be considered to be successful if the project goals are achieved.

Campuses are communities and must have the facilities, including buildings, open spaces,

Circulation systems, utilities, and so on, to serve their students, faculty, staff, and guests. Like any community, universities and colleges must be carefully laid out in order to create a physical environment that is functional, pleasant, safe, sustainable, and supportive of its wide-ranging programs. Master plans are the overarching expression of that physical environment, with an implementation program for achieving the desired conditions.

Balsas (2003) notes that college campuses are very distinct communities. They are places, where people of different backgrounds, incomes, lifestyles and attitudes do come together to live, study, work, and recreate (p. 36). The challenge lies in integrating these various elements within the university community.

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academic programs and auxiliary activities. Basically, a master plan includes such tasks as: a) review existing situation, b) inventory, review and analyze the current policy framework, c) develop a coordinated set of general planning principles, d) formulating a land-use plan, and e) program and time-line for improvements.

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The term of “master plan” is a design practical tool, which can be more formal and architectural than the urban design guidance (Cowan, 2005). It re-establishes the principles and linkages of different places. Studies suggest a relationship between the built environment and its impact on the study of students in the university. In this regard, Strange and Banning (2001) said ‘it is clear that the campus environment is an important feature that influences students’ attraction to and satisfaction with a particular institution’ (p. 12). They note that the influence of physical environment on behaviour has been conceptualized in three distinct positions:

1. The position of architectural determinism, which is about the link between built environment and behaviour within it.
2. The architectural or environmental possibilism as a source of opportunities that may set limits on behaviour.
3. Architectural or environmental probabilism, emerged to capture the probabilistic relationship between physical environment and behaviour (Strange and Banning, 2001).

The master plan provides a comprehensive assessment of past and current developments in the city and produces direction or vision for a long time in the future (Boyer, 1983).

Two questions though to be raised

- Why do we make Campus Master Plans?
- When should we update Campus Master Plans?

Good plans are adaptable and responsive to changes in program needs. Many campuses use a regular review to gauge progress and make adjustments to accommodate programmatic changes. Intervals of two to five years are usually adequate to recognize changes in academic programs, technology, and other needs that will drive adjustments to the plan.

From time to time it is important to undertake more than a routine review and reexamine the premises and principles. The most common principle is in which a major new master planning process initiated. (Kaiser, H. (2009))

To apply the previous questions on KSU as a case study, next section therefore presents the historical phases of KSU Campus Master Plan development.

### **3. KSU Campus development phases**

KSU campus has undergone three development phases as follows:

- 3.1 Phase (1) first version Master Plan (1974)
- 3.2 Phase (2) from 1<sup>st</sup> to 2<sup>nd</sup> version Master plan
- 3.3 Phase (3) the second version Master Plan (2009)

#### **3.2 Phase (1) first version Master Plan (1974)**

As illustrated in Figure (1) the first KSU version Master Plan was commissioned in 1974 with the construction of the loop road and utility services being completed in 1976. In 1980, the academic area facilities were redesigned. The new design framework provided structural order and function for the campus.

**Figure (1): The First Version KSU Master Plan**

Figure shows (2) the development of the KSU campus from the time of its inception until today. Mapping these patterns of growth provides an idea as to whether there is a need to rethink the future development strategy of the campus.

It appears that some of the early projects were the development of the Hospital and related staff and faculty housing.

In the early eighties, the spine was developed and the various colleges were established within KSU. This development continues to shape the development pattern of the campus.

**Figure (2): KSU Development Timeline**

However, in the last twenty years there have been a relatively limited number of projects that have been carried out. These projects include the play fields and Sports City, the Department of

Linguistics and Translation, the Boys intermediate and High Schools and the Secondary School for Girls.

As one can see from these maps, after the development of the spine, the majority of construction on campus has been in the form of infill projects. No significant structural changes to reshape the growth of the campus have taken place since its inception.

### 3.3 Phase (2) from 1<sup>st</sup> to 2<sup>nd</sup> version Master plan

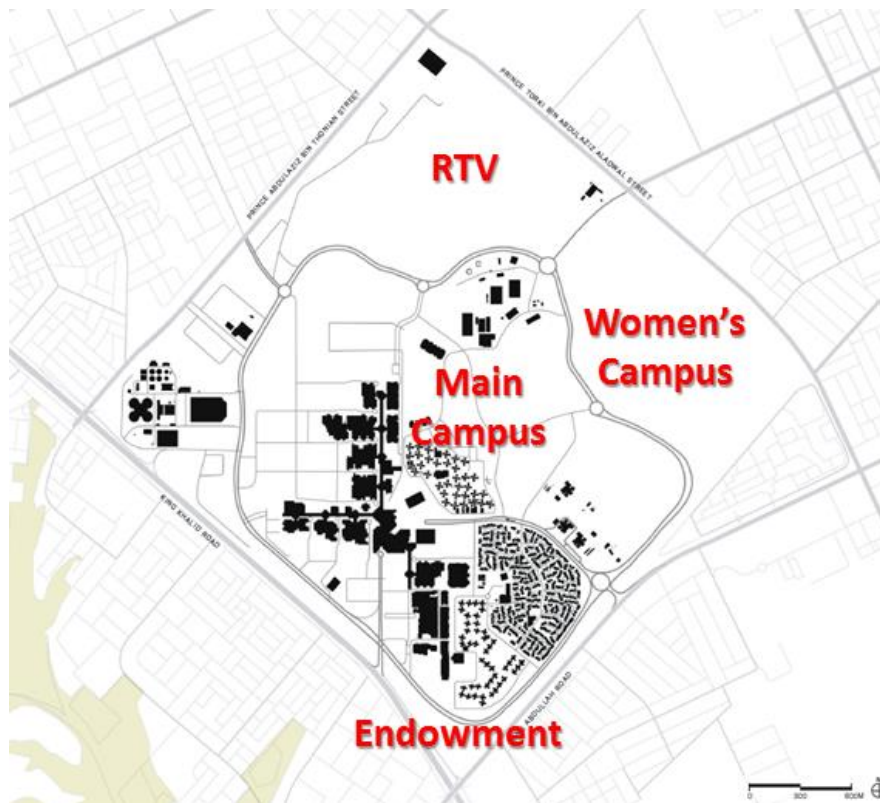
Figure (3) shows the proposed projects that are currently under construction or are in advanced stages of planning and design within the KSU campus.

Proposed projects can be distinguished into two major categories:

1. Projects that are more long term and strategic in nature that focus on growth of the campus like the Women's College, Endowment and the Riyadh Techno Valley (RTV) Campus.
2. Projects that are being built to provide immediate solutions to some of the key infrastructure issues on the campus like parking, or housing

New major projects like the Women's Campus, the RTV and the Endowment Project are being planned as developments that are fairly independent of the main KSU campus. While technically within the boundaries of KSU, there are limited connections to the main campus.

**Figure (3): KSU new major projects**



The development of parking decks is a move in the right direction to consolidate parking and bring it closer to the main buildings. It is not clear if parking deck locations have been developed with a long-term strategy of a “park once and ride transit” approach, which perhaps may be more appropriate for a growing campus of this size.

The proposed projects leave an opportunity for future projects to bring better and more functional vehicular and pedestrian access.

### **3.4 Phase (3) the second version Master Plan (2009)**

#### **Master Plan Process**

##### ***Project Intention***

In December 2008, a kick off meeting was held at King Saud University campus. The meeting brought together representatives from various departments and colleges of the university to discuss the issues and concerns related to the master plan development process and to find the proper solution to them. Diagnostic meetings comprising members of the Consultant's team, the Rector, and members of the Strategic Planning Team were held over five days to establish the vision and goals of the project.

##### ***Site Analysis***

A comprehensive site analysis was carried out. The analysis examined the current land uses, traffic movement, environment, and utility systems on site. Through the analysis process, information and data were gathered using GIS maps, site photos, on-site evaluation, and feedback from officials, stakeholders and specialists. All these inputs were taken into consideration while developing the master plan.

##### ***Benchmarking***

To identify enhancement and improvement opportunities at KSU, benchmarking studies on comparable universities were undertaken. The universities were selected based on their reputation as research universities of similar climate. Closely examined also was the manner in which those universities handled housing, transit, parking, campus life, and open space. The findings helped develop a series of recommendations for KSU.

##### ***Programming***

On parallel with site analysis and benchmarking efforts, programming process was conducted to evaluate the existing conditions of the site in order to develop a program that would meet the University's needs over time. To gather information on existing and projected enrollment, faculty, staff, and space requirements, the programming team met with representatives from 19 of the academic colleges and the Preparatory Year staff.

Meetings were also held with Riyadh Development Authority, Ministry of Transport, Ministry of Water, Saudi Electric Company and Saudi Telecom Company.

It was agreed that the number of students was 29,571 in 2008. Data and information on buildings, open spaces, amenities and services met a set of existing needs and provided a base for forecasting future requirements, which were addressed by the master plan.

The aim was to develop three scenarios with the same goal; namely: to shift from teaching to research, something which would increase the graduate enrollment percentage:

- Scenario A: 61,986 students in 2028, of whom 22% graduate students - based on inputs from colleges, questionnaires and interviews;

- Scenario B: 29,571 students in 2028, of whom 30% graduate students - university target to essentially maintain total enrollment at the current level; and
- Scenario C: 20,237 students in 2028; of whom 30% graduate students - Strategic Plan targets to further shift from teaching to research and reduce enrollment.

### ***Concept and Final Master Plan***

After evaluating the information gathered from programming, site analysis and benchmarking processes, it was possible to reach a basis for three master plan concepts; namely:

1. Grow in Place;
2. Leverage Connections; and
3. Research Precinct.

The preferred plan was developed, which was a combination of the three concepts. The selected master plan was approved in 2009 by a higher review committee. The plan was further refined and developed to focus on connectivity between various districts, the architectural character of those districts, landscape and open spaces of the University. Suggestions and recommendations of the KSU team and other stakeholders that participated throughout the planning process were incorporated in the final master plan. Through regular updates and the creation of a Design Review Board (DRB), a framework for the implementation of the master plan was also laid out (see Figure 4).

**Figure (4): Concept Development**



### ***Land Use Plan***

The land use plan illustrates various land uses and their complex formation that make up the KSU campus (Figure 5). To get a clear understanding of the land uses, either as relative percentages or actual hectares of land allocated to each land use category, this plan should be viewed in conjunction with the district plans. It is important also to note that there can be variations within the actual building use itself although a certain piece of land may be categorized for a specific use. For example, a building for commercial use may have commercial as the dominant use with a residential component within it.

To maximize the efficiency of infrastructure, define distinct characters for different districts and neighborhoods and create a high quality of life for the campus, land uses were distributed into thirteen different categories: academic; research; medical city expansion; medium density residential; low density residential; sports and recreation; open space; service and utilities; mixed use; neighborhood retail; parking; commercial / office; and civic

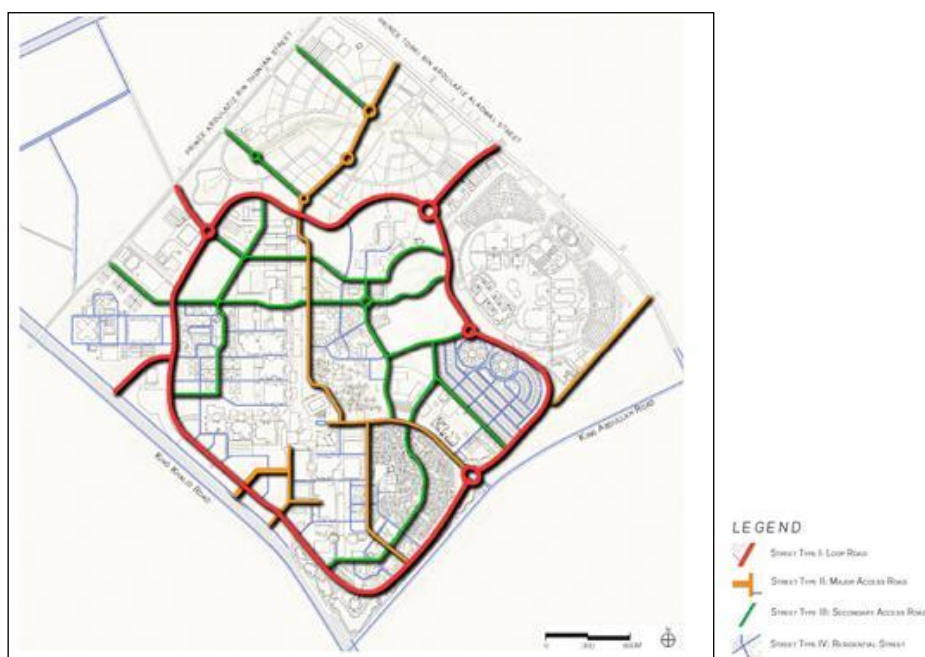
**Figure (5): Proposed Land Use Plan**



**Street Network**

Streamlining traffic and providing more connections cross the campus are the main focus of the proposed street network of KSU.

**Figure (6): Street Network**



The balanced approach, adopted as a part of this master plan, recommends a connected street network allowing for vehicular transport and serving other modes of traffic, like transit and pedestrians. In addition, function level of access of the street network is defined by a hierarchical system of streets. The top level of this hierarchy as presented in Figure (6) is represented by the loop road and entry roads, with limited access and high mobility characteristics. The next level includes the major access roads. These together represent the top level street framework for the campus. The secondary access roads and the residential streets have low speeds but high access characteristics.

### ***Implementation***

The campus implementation phases have been divided into the three major phases, for purposes of consistency and ease of control:

1. The Near Term: it includes the priority projects that are currently underway or that will be implemented within the next five years (0 to 5 years).
2. The Short Term: 5 - 10 years
3. The Long Term – 10 - 20 years

The phased implementation of the master plan is recommended for several key reasons that allow for:

- Making substantive additions based on needs and available funds.
- Staging the development works to minimize inconvenience to existing functions, which is particularly true in case of renovation projects including demolition and reconstruction activities.
- Adaptation to changing conditions.
- Reconciliation of implementation priorities with realities, and adjusting accordingly to achieve balanced expansion.

The phasing strategy also includes the developments projected after the 20-year timeframe, based on campus development within the realm of this master plan.

### **4. Lessons to be learned**

The campus master plan of the King Saud University provides a planning framework for long term campus development. The updated campus master plan provides recommendations and guidelines that help it to become more unified, cohesive and pedestrian-oriented organization, reflecting the values of the university and effectively supporting learning and people life.

The plan considered planning principles, such as: balanced land uses to better utilize the campus; improve street network in order to facilitate access, streamline traffic and mitigate congestion; leverage alternative transportation modes, such as bus and rail; create residential areas, provided with community services and amenities; mitigate congestion generated by the hospital / medical city; enhance open spaces and campus life; reserve land for future uses; preserve local environment; improve parking distribution around the campus; promote pedestrian movement and accessibility; maximize utilization of capital funds; facilitate implementation of the proposed plan; accommodate development phasing; and adapt to future changes and developments.

Using these planning principles, the master plan was structured around growth and expansion of the campus future development. The master plan seeks to have several activities within walking distance from the campus, including academic and administrations buildings, research centers, retail facilities, housing facilities, recreation facilities and public services. This diversification of specific uses across the various zones is crucial to improving the marginal areas of the KSU campus.

The old master plan lacked such open spaces, the major problem which the new master plan addressed having well-defined open and green places that will serve as recreational and gathering areas and link buildings or zones to one another, through specific paths.

The master plan vision is intended for implementation. Without a well-structured implementation strategy, the plan could remain unrealized or could be haphazardly implemented, which could be detrimental to the university. Implementation elements are crucial in realizing the complete vision of the master plan and in achieving intended goals of the university.

The needs of the university need to be reviewed and revised periodically to keep pace with the rapid and continuous developments and ensure smooth functioning of the university. Most prominent universities engage in a master plan update every five years, which ensures two things: keeping track of needs and aligning capital project to funding cycles.

The 5-year update can constitute a comprehensive review and revision of the master plan. However, there might be a need to incorporate some modifications and changes, necessitated by the execution of certain planned projects, in order to keep the master plan updated.

### **Points to taken into consideration when developing the master plan:**

#### **Special Area Plans**

Occasionally, there might be a need to develop master plans for certain districts or special areas within the university campus, focusing on the specific needs of those districts or areas, while maintaining, at the same time, the overall vision of the campus master plan, to allow for the creation of specific character districts within the whole fabric of the campus.

#### **Campus Planning Department**

Like most universities, King Saud University implements the master plan through a Campus Planning Department, including an associated Facility Management Department and a Capital Projects Department. For KSU, the Campus Planning Department should be under the leadership of the Vice-Rector for Projects.

The Campus Planning Department takes the responsibility of overseeing the implementation of the master plan and approving new projects based on their compliance with the master plan. Members of this department keep track of the impact of new projects on the overall master plan and update the master plan with new information as it becomes available.

The success of any campus master plan depends on the existence of a strong and well-focused campus planning department. Luckily, KSU has such a department, which can coordinate the demands and requests of various colleges, and accomplish the vision of the master plan in all aspects.

#### **Design Review Board**

The quality of campus environment depends on the achievement of the vision as set forth in the master plan through effective design control. Individual users of various facilities tend to maximize

their usable area and functional arrangement of space, while projects management and facility management departments might be concerned, in most universities, with the capital requirements and compliance with the planned schedule.

These differing interests need to be balanced, keeping in mind the long term view of the financial, design and functional implications of any certain project on the overall campus. This can be achieved through active and continual involvement of different stakeholders along with the participation of the Design Review Board (DRB).

The DRB is comprised of about 6 members, including representatives of college of architecture, other faculty staff interested in the design of the campus, administration department, central services, public utilities and design professionals.

The Board should be represented in each architect selection committee entrusted with the selection of the new projects. In addition, projects should be reviewed at every major milestone, program, concept, schematic and detailed design phase. All major planning, landscape, and architectural projects should be reviewed by the DRB, while smaller projects could be reviewed through a shorter process.

### **Public - Private Partnerships**

The expansion and improvement of university facilities not only depends on demand but also on the funds available to implement the new projects required. In this regard, partnerships between public and private sector enterprises can provide a win-win opportunity for universities that do not have the sufficient capital inflows. Private sector developers can be involved in satisfying university needs and improving the campus environment.

## **5. Conclusion**

Master plan set out the framework for an improved campus and university image. KSU master plan has identified key development and enhancement issues for the university campus and has translated planning principles into specific proposals and guidelines for implementation. The master plan focuses is oriented around the following:

- Function: further expansion of the campus, streamlining vehicles flow, and improving parking in the campus.
- Economy: efficient building and site operation.
- Form: sustainable development strategy and a pedestrian friendly environment.
- Time horizon: short, near and long term phasing strategy.

The new master plan recommends different actions to meet KSU academic space needs, including redesign of service areas, internal courtyards, and some existing surface parking to enhance accessibility, connectivity, and space usage.

The plan pays more attention to the improvement of pedestrian connections between the academic core and spine areas and residential and parking ones. In addition, it recommends the creation of a hierarchy of streetscapes to reinforce accessibility to the campus, foster pedestrian traffic, and improve vehicular circulation.

Finally, site design and landscape architecture were utilized to enhance the distinctive architecture, circulation, parking and pedestrian activities as well as the character of the campus.

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