



# Controlled Free Choice Method: A Proposal for a New Undergraduate Major Selection Policy at King Fahd University of Petroleum & Minerals

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The prevalent undergraduate major selection at King Fahd University of Petroleum & Minerals (KFUPM) mostly depends on the student's choice regardless of academic abilities and qualifications. Owing to the adoption of this Free Choice Method (FCM), the number of students will continue to grow and external pressures at the national level may force the university to expand the admission intake every year, making it very difficult to expand and cut back programs as before. The accumulated effects threaten inefficiencies such as underutilization of some departments and majors. To address the immediate and subsequent negative impacts of FCM, this research proposes a Controlled Free Choice Method (CFCM) to ensure proper utilization of existing resources, reflect national needs in determining departmental capacities and stimulate student performance. The CFCM is based on student performance and preferences plus a cutoff GPA obtained in the orientation level in specific courses or all courses for each department. Under this procedure, departmental capacity will be determined prior to intake, thus maintaining the proactive nature of this approach. Finally, the CFCM is evaluated with respect to the limited scale responses of individual departments and colleges.

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## Introduction

### King Fahd University of Petroleum & Minerals (KFUPM): a brief history

KFUPM was officially established by Royal Decree on 23 September 1963. The first students were admitted a year later. Since then, the University enrollment has grown to 6,500 students in 1994–1995 and currently stands at



about 9,000 students. Several significant events have marked the university's growth. In 1971, at the first graduation ceremony, four men received their baccalaureate degrees in engineering; since then, more than 8,575 degrees have been awarded. In 1975, the College of Petroleum and Minerals became the University of Petroleum and Minerals, a change both in name and in academic status. In 1986, the university was renamed The King Fahd University of Petroleum & Minerals (KFUPM, 2005). The successful management of Saudi Arabia's vast petroleum and mineral resources poses a complex and exciting challenge for scientific, technical and management education in the Kingdom. The university furthers knowledge through research in these fields.

The university is divided into seven academic units principally concerned with instruction and research; these are the College of Applied Engineering, the College of Engineering Sciences, the College of Sciences, the College of Industrial Management, the College of Environmental Design, the College of Computer Sciences and Engineering and the Preparatory Year Program (KFUPM, 2003, 2004, 2005). Each of the academic colleges is managed by the Dean of the college and the Chairmen of the academic departments.

### **The Preparatory Year Program**

All newly admitted students are required to complete the Preparatory Year Program before starting undergraduate study. Students may be exempted from part of or from the entire program according to the implementations rules of the promotion exam. The Preparatory Year Program lasts 1 year, divided into two regular semesters and a summer session, if necessary. It represents the first and second academic levels of all undergraduate programs. The student's grades in the preparatory year courses are included in his transcript together with the semester GPA and the cumulative GPA. However, these grades are not considered in calculating the cumulative GPA for the undergraduate program. The academic status assigned to the student at the end of his last regular semester in the preparatory year continues through his third academic level (i.e. first semester of the freshman year).

Student performance will be evaluated at the end of the preparatory year to identify those who meet the university's preparatory year requirements. Student performance in all the courses taken shall be considered in addition to the results of all the exams students appeared for at the end of the program. The levels of evaluation are set out below.

#### *Completion of the Preparatory Year Program*

A student may register for the third academic level if the following requirements are met:



- (a) successful completion of all preparatory year courses with the grades indicated below;
- (b) a grade C or better in the first and the second-level courses of English in the preparatory year;
- (c) a grade C or better in the first or the second-level Mathematics courses in the preparatory year.

A student is promoted to the third academic level after completing all preparatory year requirements. This takes place at the beginning of the semester immediately following completion of these requirements. The student may take any of the majors offered by the university, provided the required criteria for that major are satisfied.

#### *Partial completion of the Preparatory Year Program*

If a preparatory year student meets only the requirements of either the English or the Mathematics course only, he will be eligible to study some third-level courses, provided he simultaneously completes the remaining preparatory year requirements during a single semester; otherwise, he will be obliged to dedicate his time exclusively to the preparatory year.

#### *Dismissal from the Preparatory Year Program*

A student will be dismissed from the Preparatory Year Program if either:

- (i) he earns the grade F or DN or WF twice consecutively in the same English or Mathematics preparatory year courses, or
- (ii) he fails to complete all the preparatory year courses within three regular semesters, as opposed to the two semesters usually required to complete the preparatory year.

### **Current processes of selecting a major**

Choosing a major is an important decision. Making the right choice will save both time and money, and increase the chances of obtaining a job the student will enjoy (Andrews, 1997). Every year in the USA, more than 3 million college sophomores and juniors face the task of selecting an undergraduate field of study. For some this is easy; however, many find it challenging and often confusing (Machado, 2002).

The current major selection process at KFUPM employs a free choice method (FCM), where students are allowed to opt for a major of their choice with no strings attached. They are allowed to enroll in that major regardless of academic abilities and qualifications. The FCM does not take into account that



student GPA is a factor in the probability of their graduating within the normal time.

### **General misunderstandings in choosing a major**

Misunderstandings exist among students regarding major selection: for example, whether to select a major by taking courses for general education, or whether to pick a major for a particular career, etc. (Pennsylvania State University, 2004a). If a student takes a course simply to learn about a major, then he will actually have wasted one major if his decision happens to not suit him. At KFUPM, general education courses are not extensive. Moreover, every course in the list cannot serve every major. Students usually fail to take into account the major and their career very often go hand-in-hand. That students in any specific major are qualified only for careers in that specific area is not a valid assumption.

### **Current major selection process analyzed**

#### **Concept of the FCM**

KFUPM allows a student open choice in selecting any field he likes on finishing the orientation year. This is justified on the grounds that the administration believed it could expand a department when many students opt for it and *vice versa*. Recently, this concept has been challenged for a number of reasons. Student numbers have increased dramatically since the FCM was first adapted. They will continue to grow and external pressures at national level could force the university to expand admission intake every year, making it very difficult to expand and cut back programs as before. The dilemma will deepen as the number of Saudi faculty increases since they are permanent employees who cannot be transferred. Furthermore, financial resources have been continuously scarce.

Many students make injudicious use of the ‘free choice concept’ of KFUPM by joining certain popular departments (Electrical Engineering and Mechanical Engineering, for example) under the influence of their peers but without having the minimum capabilities to graduate from those departments (Aldosary and Assaf, 1996). Many join those departments and then drop out of the university — a drain on the resources of those departments in demand apart from the more serious issue of possibly lowering the quality of graduates from those departments.



### **Concerns about FCM**

- The existing scheme produces inefficiencies by underutilizing some departments and majors and by over-stretching others, at least in the short term.
- Underutilization in the face of present and rising demand for higher education is not easily justified.
- There is no clear evidence that existing FCM sufficiently reflects market demand. Responsiveness to the market is probably neither efficient nor timely.
- There is no evidence that the existing FCM reflects students' real interests or aptitudes. Student choice of majors is probably more related to crowd mentality, peer choice, stereotyping, etc.
- Attachment to the existing FCM is not of necessarily wholly rational. There is no clear evidence that it produces what it is supposed to produce (i.e. to serve the academic interests and aptitudes of students while being an accurate reflection of valid market demand). Supporting FCM is probably more related to its ideal and to abiding by tradition.

### **Capacity determination and utilization under the FCM**

Currently, capacity is influenced by the following situation:

- Departments have no direct control over their size in terms of student numbers.
- Departments adjust to or react to changes in the volume of student numbers by increasing their resources (e.g. increasing faculty recruitment).

Some of the organizational dynamics that weigh in the present situation are as follows:

- Departments are continually alert to the need to adjust to the demand on their programs.
- When student numbers grow, the Department recruits and finds it necessary to be more efficient in the use of existing resources.
- When student numbers shrink, the Department may put recruitment on hold, but will be unlikely to reduce resources.
- Departments with falling student numbers will find ways to utilize resources — often inefficiently — rather than reduce them (e.g. reduce load, reduce section size, etc.)

Other organizational dynamics that may be anticipated irrespective of the situation are as follows:

- Departmental size is a source of perceived power or prestige in the university.



- Efficiency and the propensity to accumulate power are not necessarily compatible.
- At the Departmental level, perspectives are less macro and more influenced by interdepartmental competition.
- Once established, an organizational unit or program is reluctant to die.
- There is no guarantee that existing attitudes and methods of operation will hold when a specific change (e.g. that departments control their intake capacity) is introduced and internalized. The institution must appoint Guardians of Change to ensure desirable attitudes are upheld.

### **Controlled Free Choice Method (CFCM) and international experience: a proposal**

The main features of the CFCM are as follows:

- Students with a GPA less than 2.0 should not be promoted to the freshman year.
- The Vice Rector for Academic Affairs through College Councils should require every department to define annually the number of orientation students to be accepted the following year. The preferred student volume should be taken into account in the light of the capacity of the department to sustain the level of quality among KFUPM graduates. Drop-out rates should be incorporated into this estimate.
- Every orientation student may choose three departments rank ordered by preference.
- Computer software should be developed to organize all students according to their three chosen departments, and taking into account their orientation year GPA in descending order.
- The program should set a preliminary cutoff point in orientation GPA for admission in each department, given its capacity.
- Students whose first choice is accepted are deleted from those lists containing their second and third choices.
- After their deletion, the computer program sets a new cutoff point in orientation GPA for individual departmental admission, on the basis of the department's estimated capacity.
- Reiterations may be undertaken for students requiring allocation to a department that figures as their second and third choice until the process of allocating students to departments is complete.
- Should a student not be allocated, then he will make three further choices and will be allocated in the light of his orientation GPA.
- *Change of majors*: To prevent the switching of majors from upsetting the distribution — in some colleges about 30% of their enrollment have



'switched' majors (Aldosary, 1999) — the following suggestions are put forward:

- Changes can only be made after 1 year, and based on places available.
- Departments approve changes, but cannot enact them. Hence, KFUPM administration should set up a procedure to ensure that the number of students in a department does not exceed what the department itself previously estimated. Statistics on student number from the central registry should be used to ascertain whether a student may change departments.
- No more than one change is allowed to preserve university resources. Double majors are discouraged, except for students with a GPA > 3.0. Once a major is elected at the beginning of the freshman year and with a cumulative GPA below 2.0 at the end of the sophomore year, such individuals in this situation should be required to change major before it is too late.

These procedures need to be piloted on the basis of student choice before finalizing them for implementation.

### **Determining capacity according to the CFCM**

#### *Concerns:*

- Under the revised CFCM admission scheme, capacity at program level needs to be set *a priori*, whereas current practice is the reverse.
- The potential dynamics of the process will be an important aspect.
- Is there a concern about the validity of departmental or college estimation of capacity?
- What is the likelihood of over- or underestimation when intake capacity is done primarily at the departmental or at college level? (Figure 1).
- Departments are expected to avoid pressures usually associated in adjustment periods when the demand on them is growing. Departments will prefer slow growth to fast growth unless they possess excess capacity.
- Departments' notions on efficiency are expected to be more conservative than that of the university or society (due to internal dynamics and their being relatively protected from external social pressure).
- Internal dynamics and politics at the departmental level will influence capacity estimation (the tendency will be to resist increases both in work load and in size)
- The attitude toward recruitment when it is used proactively (the new situation) will be different from it when it is employed reactively (the present situation).

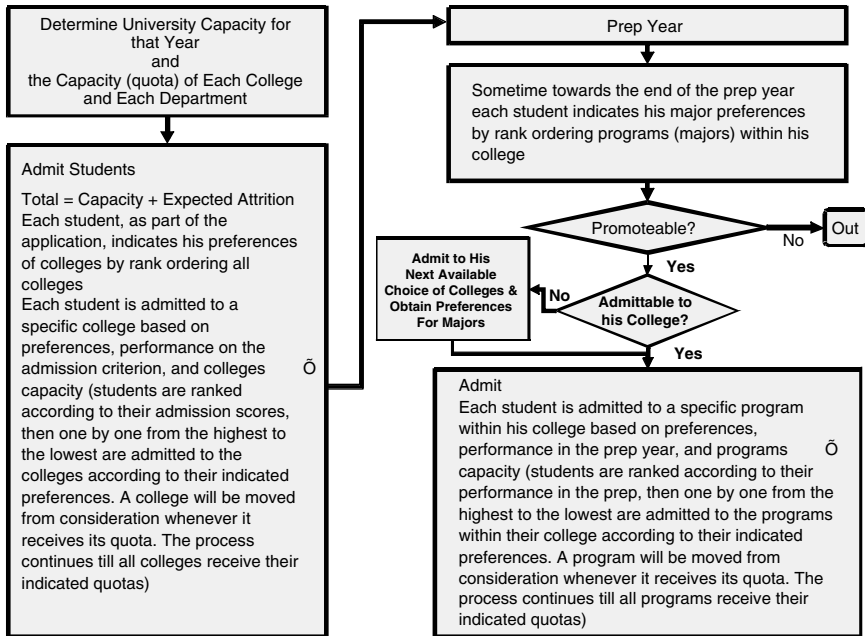


Figure 1. The flowchart of CFCM.

- Under the present scheme, recruitment and its timing respond to a student intake capacity which is imposed.
- Under the revised scheme (CFC), departments will be tempted to estimate intake capacity in light of the previous practice and existing and assured resources. The danger arises from the possibility of holding resources (e.g. number of faculty) almost constant to maintain capacity (i.e. there is no external pressure on departments to raise recruitment or to use existing resources more efficiently).
- Relying simply on the competitive rivalry of departments to be the biggest and the best is not and should not be the only guarantee.

*Recommendations and warnings:*

- Final estimates of intake capacity should be at the university level.
- Input of departments and colleges should be an important factor in this process.
- Determining intake capacity should take into account the needs of the nation and the market for graduates in stipulated fields (there is no



justification for creating an oversupply simply to use capacity, and still less justification for undersupply by holding capacity constant).

- In the final estimation of intake capacity, more objective measures, such as current and real use of existing resources, should be recognized.
- Estimating the intake capacity should induce departments to raise recruitment if warranted.
- Calculating intake capacity should not be held hostage to an earlier incrementalism and its associated inefficiencies. More should be paid to less obvious data such as the number of credit hours generated per faculty.
- Calculating intake capacity should also not sideline the basic fact that departments, when pressed, do adjust and do deliver.
- A more accurate and systematic forecasting system is required. The university should establish a unit for forecasting its needs and requirements, thereby allowing it to be more in tune with the needs of the nation and the market.

### **Potential problems of CFCM**

- The new scheme is more complex to manage.
- The new scheme requires accurate and valid laying down of capacity that must reflect efficient utilization of existing resources (even in popular programs), of national needs, be sufficiently induce that departments procure resources and take future needs into account.

### **International experience**

Pennsylvania State University, USA employs the controlled major selection method. Entry to a specific college is constrained by the college's individual requirements. Students are supposed to have a specific GPA (2.00) to enter any major. Students cannot opt for a major whose enrollment limits are already reached (Pennsylvania State University, 2004b). University of California Santa Barbara (UCSB), USA requires auditions, placement examinations, proposals, specified courses and/or grade-point averages to determine whether students are qualified for specific courses for entry to or continuation in a major (UCSB, 2002–2003). In the National University of Singapore (NUS), Singapore choosing a major depends on the individual's performance in secondary and in higher secondary examinations, and their preferences (NUS, 2004–5).

In the State University of New York (SUNY) Brockport (2004), an *Ad Hoc* 2.5 GPA committee was given the task to develop a policy that demanded a 2.5 overall GPA for entrance to a major. The committee recommended that all students who meet the college entrance or transfer requirements should be



allowed either to declare a major or to file intent to major in any discipline. Departments should not require a standard for admission to their majors higher than the college standard, unless this has been accredited. Departments can set a GPA requirement for continuing in, or satisfactory completion of, the major.

### **Department response to CFCM**

A detailed letter was sent to all academic Deans requesting input from their departments and asking them to study the initial proposal on CFCM. The responses of the departments and colleges can be summarized as follows.

*College of Computer Sciences and Engineering:* The Computer Engineering (COE) department is in favor of the CFCM, while the Information and Communication Science (ICS) and System Engineering (SE) departments are opposed to it. They pointed out that the CFCM will have a negative impact on student interest. A career planning center is needed at the prep-year level, given national manpower needs to fulfill the market demands.

*College of Engineering Sciences:* The Mechanical Engineering (ME) department generally agreed with the development of a new policy for choosing the major at KFUPM. There were some reservations, however. It was suggested that from the start KFUPM student should be accepted in specific colleges with an appropriate Preparatory Year Program for each college. The main determinant of the size of each academic department should be the job market.

The Chemical Engineering (CHE) department's input did not touch upon the CFCM proposal. The CHE department has been through difficult times having had to cope with sharp rises in the number of students in the mid-1990s.

*College of Environmental Design (CED):*

- a. CFCM will improve the efficient utilization of resources.
- b.  $GPA < 2$  was not seen as not practical.
- c. Students should state 10 preferences the start rather than the four suggested.
- d. A course on 'career planning' should be introduced in the Preparatory Year Program.
- e. Implementation of the 'career oasis' program
- f. Directing students with low GPA to the Colleges of Environmental Design & College of Industrial Management (CIM) will damage the image of the departments and affect the programs negatively.

*College of Industrial Management:*

- g. All departments were not in favor of the CFCM method.
- h. Selection of majors is based on social influence and market demands.
- i. Low enrollment in some majors is not a good reason to change.
- j. Departments suffering from large enrollment may impose temporary restrictions.



*College of Sciences (CS):*

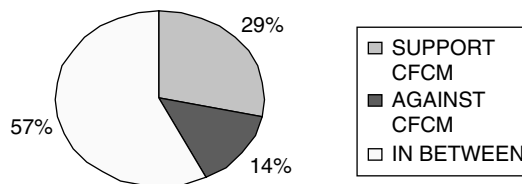
- k. Math Department
  - i. In favor of CFCM
  - ii. Selection of majors for Science & Engineering should be at the Freshman level, while the Colleges of Environmental Design & Industrial Management may require a different scheme.
- l. Physics:
  - i. Students with low GPA use Physics and other departments as a transit to improve their GPA then transfer to Engineering.
  - ii. CFCM may solve the problem partially and temporarily.
  - iii. The job market should be considered.
  - iv. CFCM will direct students with low GPA to major at the College of Sciences.
  - v. GPA of 2.5 or above for a student to major in Physics will stop the inflow of students with low GPA.
- m. Earth Sciences:
  - i. Supported the CFCM.
  - ii. Students with GPA lower than 2 may be given the choice to opt for other departments not requiring a strong background in MATH 001 and 002.
  - iii. Was in favor of implementing the CFCM on a trial basis for 2 years.
- n. Chemistry:
  - i. CFCM failed to realize that the current approach is not as 'free' as the proposal states. Certain departments already apply some constraints.
  - ii. Students should select their majors after the Freshman year, or a student with GPA of 2.5 or more by the end of Freshman should be allowed to change his major.

**Analysis of the responses**

Around 29% of all departments support CFCM without reservation. On the other hand, 14% refused to accept the proposal as an efficient method to face existing and incoming problems of KFUPM. Most of the departments asked for the proposal to be modified (Figure 2).

Among the modifications asked for were introducing courses on career planning, changing the cutoff GPA value, examining the intake problems of some specific departments, etc. In fact, many departments proposed interesting ideas regarding the modifications of the CFCM. All of these responses are included as 'in between' in the pie chart seen in Figure 2.

Colleges with low enrollment welcomed the idea of CFCM but suggested some fine-tuning to the proposal. Unfortunately, most of the high enrollment



**Figure 2.** The responses toward CFCM by individual department.



colleges did not view the matter seriously even though the CHE report noted that it was precisely they who had suffered from high enrollments in the mid-1990s. The issue of preventing large fluctuations in these colleges was not broached.

## **Conclusions and recommendations**

Although control over the present FCM selection of majors is insignificant, the process suffers from inefficiency. Such inefficiency in turn is rooted in the student's willingness to take up a major program regardless of academic abilities and qualifications. The FCM does not take account of the fact that student's GPA is a factor in their probability of graduating within the normal time. As proposed, the CFCM can successfully align a student's capabilities with the possibility of his graduating from the department he enters. It will allow KFUPM to increase its intake without expanding existing resources. It would also permit the university to determine departmental capacities more in keeping with national needs. This proposal would motivate students to study harder, since preferences met will be perceived, at least partially, as an outcome of performance (i.e. preferences will be according to merit). The CFCM is perceived as fair, since preferences and choices are linked to measures of performance. The responses of departments to the CFCM require the latter's modification and adjustment. Moreover, student responses toward the CFCM will be born in mind so that CFCM is both acceptable and dynamic. The conclusions with respect to the FCM should be explored and analyzed further to pinpoint its inefficiencies and limitations, which will subsequently help in improving the proposed CFCM. A more comprehensive survey of departmental responses and analysis will raise the quality of CFCM. Last but not the least, the relationship between the choice of a major and academic performance should be investigated further to strengthen the acceptability of CFCM.

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