A Decision Support Model for University Management

by

P. J. Vermeulen, W. J. Rossouw, and M. J. Joubert

1University of Pretoria
2University of Zululand
Republic of South Africa
PROBLEM

PRE-1986 SITUATION

(a) UNCONSTRAINED GROWTH OF UNIVERSITIES

(b) 6% GROWTH RATE

(c) 85% GOVERNMENT SUBSIDY – UNCONDITIONAL

(d) OPEN CHOICE OF FIELD OF STUDY

(e) ADMISSION CRITERIA IN SOME FACULTIES (E.G. MEDICAL & VETERINARY) DUE TO LIMITED FACILITIES

(f) LECTURING POSTS ACCORDING TO SUBSIDY FORMULA
PROBLEM

HISTORICAL TRENDS AND EXTRAPOLATION

- SOCIAL SCIENCES
- NATURAL SCIENCES

STUDENTS

30000
20000
10000
0

1960 1980 2000
TIME

LECTURE POSTS

2000
1000
0

1960 1980 2000
TIME
PROBLEM

NEW DISPENSATION AND CONSTRAINTS

(a) GOVERNMENT SUBSIDY RESTRICTED TO 1986 UNDERGRADUATE STUDENT NUMBERS NO GROWTH INCENTIVE

(b) GROWTH IN POST-GRADUATE ENROLMENT WILL ENHANCE GOVERNMENT SUBSIDY

(c) GROWTH IN TECHNICONS WILL BE STIMULATED AT THE EXPENSE OF UNIVERSITIES

(d) NATIONAL MANPOWER REQUIREMENTS MUST BE CONSIDERED

(e) RESEARCH OUTPUT AT UNIVERSITIES WILL BE REMUNERATED BY THE GOVERNMENT

(f) HIGHER STUDENT SUCCESS RATE ENCOURAGED

(g) UNIVERSITIES ENCOURAGED TO GENERATE OWN FUNDS
PROBLEM

FACTORS CONSIDERED BY MANAGEMENT

(A) EXTERNAL FACTORS

(a) MANPOWER REQUIREMENTS
    STIMULATE/DEPRESS CERTAIN FACULTIES
    AND DEPARTMENTS

(b) POPULATION GROWTH

(c) STATE OF NATIONAL ECONOMY

(d) GROWTH OF COMPETING TERTIARY INSTITUTIONS

(B) POLICY FACTORS

(a) NUMBER AND QUALITY OF BURSARIES

(b) UNDER/POST-GRADUATE SELECTION PROGRAMMES

(c) RECRUITMENT PROGRAMMES

(d) FUND RAISING CAMPAIGNS

(e) "EXCELLENCE" OF PERSONNEL
MODEL

NOMENCLATURE OF VARIABLES IN 
FLOW DIAGRAM

(a) FER  — FRESHMEN ENROLEMENT RATE
(b) FPG  — FRESHMEN POST—GRADUATES
(c) FPGDOR — FRESHMEN POST—GRADUATE DROP OUT RATE
(d) FPGPR — FRESHMEN POST—GRADUATE PROMOTION RATE
(e) FUG  — FRESHMEN UNDERGRADUATES
(f) FUGDOR — FRESHMEN UNDERGRADUATE DROP OUT RATE
(g) FUGPR — FRESHMEN UNDERGRADUATE PROMOTION RATE
(h) SPG  — SENIOR POST—GRADUATES
(i) SPGDOR — SENIOR POST—GRADUATE DROP OUT RATE
(j) SPGG  — SENIOR POST—GRADUATE GRADUATIONS
(k) SUG  — SENIOR UNDERGRADUATES
(l) SUGDOR — SENIOR UNDERGRADUATE DROP OUT RATE
(m) SUGG  — SENIOR UNDERGRADUATE GRADUATIONS
(n) SUGPR — SENIOR UNDERGRADUATE PROMOTION RATE
MODEL

1. MANPOWER NEEDS
2. POPULATION
3. ECONOMY
4. TERTIARY INSTITUTIONS

A. POTENTIAL FRESHMEN

B.

D. BURSARIES

E. STUDENT/LECTURER RATIO

F.

C.

G.

H.

1. RECRUITMENT
2. SELECTION
3. GOVERNMENT SUBSIDY
4. UNIVERSITY BUDGET
MODEL

DECISION OPTIONS

EXTERNAL SCENARIO PARAMETERS

1. MANPOWER NEEDS IN CESM–CATEGORIES
2. POPULATION GROWTH RATE AND MIGRATION
3. GROWTH RATE OF THE ECONOMY
4. OTHER TERTIARY INSTITUTIONS

POLICY OPTIONS

1. UNDER– AND POST–GRADUATE RECRUITMENT PROGRAMMES FOR THE 22 CESM–CATEGORIES
2. UNDER– AND POST–GRADUATE SELECTION PROGRAMMES FOR THE 22 CESM–CATEGORIES
3. GOVERNMENT SUBSIDY AND DISTRIBUTION OF UNIVERSITY BUDGET
RESULTS

SCENARIO 1  * NO RECRUITMENT
             * NO SELECTION

[Graph showing student numbers from 1985 to 2005 for undergraduates and post-graduates.]

[Graph showing lecture posts for social sciences and natural sciences from 1985 to 2005.]
RESULTS

SCENARIO 2

* UNDERGRADUATE RECRUITMENT FROM 1992
* POST-GRADUATE RECRUITMENT FROM 1988
* SELECTION IN SOME CESM-CATEGORIES

![Graph showing student numbers by time]

![Graph showing lecture posts by time]

SOCIAL SCIENCES
NATURAL SCIENCES
RESULTS

SCENARIO 3  * SAME AS SCENARIO 2
* ENHANCED RECRUITMENT IN SOME CESM—CATEGORIES

![Diagram showing student numbers from 1985 to 2005 with categories: undergraduates and post-grauates.]

![Diagram showing lecture posts from 1985 to 2005 with categories: social sciences and natural sciences.]
RESULTS

OBSERVATIONS

1. SCENARIO 1 - STANDARD RUN
   * ABSORB SUBSIDY LOSSES UNTIL NUMBER OF STUDENTS AGAIN REACH 1986 LEVEL
   * NO GROWTH IN POST-GRADUATE STUDENTS

2. SCENARIO 2
   * SMALLER OVERSHOOT OF 1986 STUDENTS
   * MORE POST-GRADUATE STUDENTS
   * MORE PHYSICAL AND MATHEMATICAL SCIENCE STUDENTS

3. SCENARIO 3 - EQUILIBRIUM RUN
   * DESIRED DROP IN UNDERGRADUATE STUDENTS
   * GROWTH IN POST-GRADUATE STUDENTS - MORE SUBSIDY
   * STABILIZING OF TOTAL NUMBER OF STUDENTS