4 FINANCING

4.1 Financial profile

The financial position of the University is reflected in the following Income Statement for the year ended on 31 December 1994 and the Balance sheet on 31 December 1994 and further illustrated by making use of figures.

Summarized Income Statement for the year ended 31 December 1994

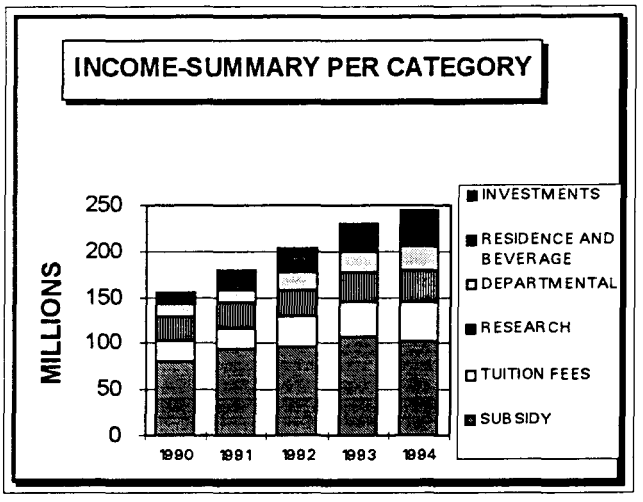
	R'000	%
Total income	245 231	100
Subsidy received	102 219	42
Operating purposes and interest	89 924	37
Capital	12 295	5
Tuition and other fees	41 625	17
Research fees	35 049	14
Departmental fees	27 978	11
Residence and beverage fees	21 840	9
Investment income	16 520	7
Less: Expenditure	243 283	99
Personnel remuneration	129 445	53
Operating expenditure	106 106	43
Interst and redemption	7 732	3
Net income for the year	1 948	1

Summarized Balance Sheet on 31 December 1994

	R'000	%
Accumulated funds	251 899	84
Long-term loans	46 940	16
	298 839	100
Fixed assets	213 497	71
Long-term investments	50 087	17
Student loans	4 438	2
Net current assets	30 817	10
Current assets	76 365	26
Current liabilities	(45 548)	(16)
	298 839	100

4.1.1 Income

Figure 9



As appears from figure 9, the gross income of the University has increased systematically from R156 million in 1990 to R245 million in 1994. In contrast to this the contribution of Government in the form of subsidy has decreased constantly in proportion to the total income.

4.1.2 Expenditure

Figure 10

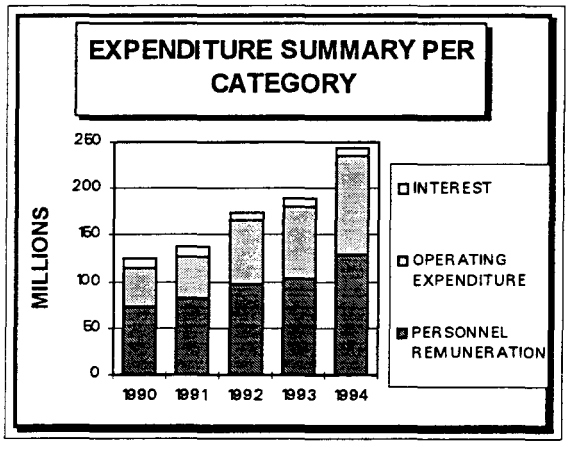
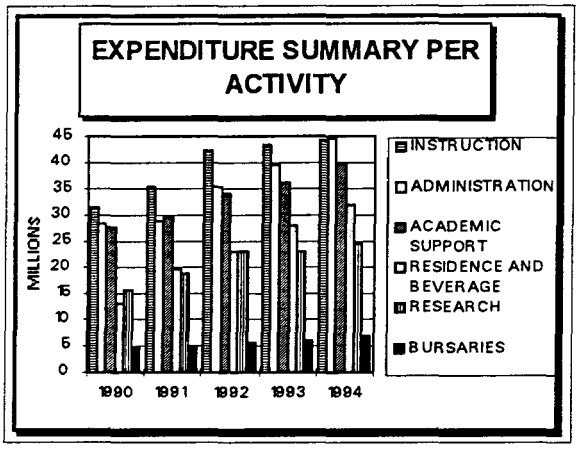


Figure 11



From figure 10 it appears that staff remuneration amounted to 60% and interest paid to 7% of the total expenditure in 1990, while the percentage in 1994 dropped to 53% and 3% respectively. In percentages a shift thus occurred from staff and interest expenditure to operating expenditure. Figure 11 indicates that with the rationalization of staff since 1990, the growth in expenditures for tuition activities has been curtailed to an extent. This has had the effect that more funds could be channelled to academic support. The strong increase in general administrative costs and maintenance costs for equipment, laboratories, buildings, and sites is, however, a concern. This increase can mainly be ascribed to obsolete equipment, laboratories and buildings which necessitated additional maintenance expenditures.

4.1.3 Balance sheet

Figure 12

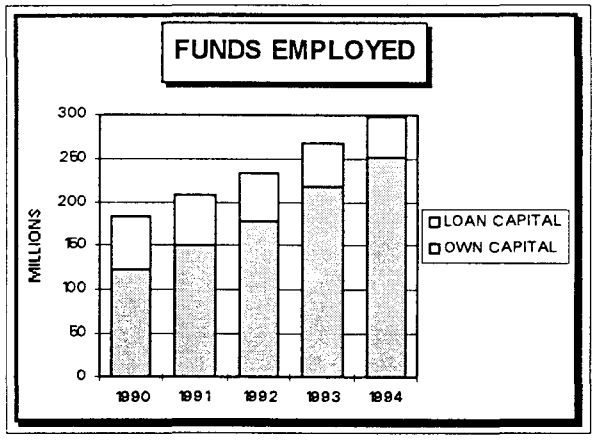
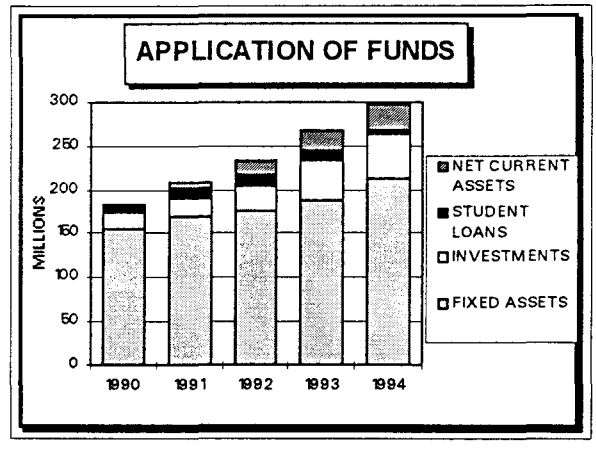


Figure 13



Since 1990 the University's ratio of borrowed capital to own capital has annually improved from 1:2,1 in 1990 to 1:5,4 in 1994 (cf. Figure 12). From Figure number 13 the following positive aspects appear, namely that the University:

- could succeed in converting a negative net current liabilities position as in 1990 into a positive net current assets position;
- the small investment portfolio of the University grows systematically;
- the student loan portfolio of the University has dropped in that, firstly, study loans were mainly awarded to students by commercial banks since 1993 against the sponsorship of the University. The University is thus co-responsible for the study loan until a student obtains a degree. Secondly, the University discounted student loans of approximately R11 million to a commercial bank during 1994.

4.2 Financial policy

4.2.1 Income-based budget and budget management

Annually a break-even budget is drawn up according to which the University's estimated expenditure is restricted to its estimated income. Financial management and budget control have been delegated to departmental level. Strict financial discipline is applied in that departments are not allowed to exceed budgets. Saving is encouraged in that departments are allowed to transfer unappropriated funds to a departmental reserve fund on which interest is earned and which can be used by the department in a subsequent financial year.

4.2.2 Cash management

With the daily management of the cash portfolio it is attempted to have each available Rand yield the maximum output on the money market.

4.2.3 Investment management

The University's small investment portfolio which is managed with the assistance of a broker, has grown systematically over the past number of years, because investment income was consistently capitalized and not used for the financing of staff and operating expenditures. Since 1994 part of the investment income has, however, been utilized for the financing of programmes, infrastructure and buildings which are of strategic importance to the University.

4.2.4 Building maintenance management

The University follows a policy of preventive maintenance. According to this the University's buildings are renovated and maintained according to a ten-year plan.

4.2.5 Replacement of existing laboratory equipment and research apparatus and purchasing of new equipment

As a result of the continuous decrease in state subsidy the University can simply no longer afford to replace obsolete laboratory equipment and research apparatus from the university budget. The University is strongly dependent on research contracts for the substitution of this equipment and apparatus. Nonetheless, the technological deterioration and ageing of laboratory equipment and research apparatus is an immense source of anxiety for the University. Laboratory equipment and research apparatus are the items which usually fall victim when expenditure has to be cut down to balance the budget.

4.2.6 Construction of new buildings

Since the University is already an established university and with its geographic location away from the large metropoles, growth occurs slowly. New buildings are thus erected only if the construction of such a building is of strategic importance to the University. As far as possible these projects are undertaken in partnership with the private sector.

4.2.7 Staffing and staff remuneration

In the South African context the PU for CHE is considered an intermediate university. The principle of economy of scale thus does not apply here, which has the consequence that departments can be cost-ineffective - too few students for the number of lecturers or too many lecturers for the number of students. To address this structural problem, a drastic and traumatic staff rationalisation programme was undertaken since 1990 over the complete spectrum of C1, C2 and C3. In this period 92,41 SLE's were removed from the personnel budget. This reduction can, however, only occur to a certain level, otherwise the complete system can collapse.

In the second place the annual salary increases of C1 and C2 personnel were restricted to the absolute minimum - considerably lower than the annual rate of inflation. Last-mentioned policy has had the effect that the University's salaries are not at all market-related with that of the private sector nor with that of the public service. On the other hand the University is also busy with a planned phasing-in stage according to which the salary gap between C2 and C3 categories will be eliminated.

4.3 State subsidy

Universities play a central role in the development of a country. Where South Africa is a developing country, it is important that this source (universities) of high-level expertise, knowledge, technological innovations and development of human potential, must be pampered and properly maintained by government. With the continued annual reduction in state subsidy the State has placed the universities on the road to self-destruction.

- Infrastructure cannot be maintained properly and starts to deteriorate.
- Research apparatus and laboratories become technologically obsolete and quality teaching is lost.
- The salary deficit of university staff, the biggest asset of a university, in comparison to that of the private and public sectors increases annually, with the result that universities lose their best personnel to those sectors. It is consequently extremely important for state subsidy to be stabilised on a certain level. The a-value should be fixed on a particular level. The current subsidy formula has definite flaws and ought to be adjusted. Here it is particularly uncontrolled growth in student numbers which should be watched.

4.4 Student fees, bursaries and loans

4.4.1 Student fees

Because the PU for CHE is a rural residential University, attempts are made to keep tuition fees and food and lodging fees as affordable as possible for students. Therefore it is annually attempted to restrict increases to below the rate of inflation. Food and lodging services are managed as a separate self-sustaining department which is not subsidized by the rest of the University's activities.

In order to register as a student at the University a student must annually pay certain minimum fees on registration. For 1995 those minimum fees were as follows:

Full-time students living in residences	R2 200
Full-time students not living in residences	R1 350
Part-time students	R1 050

Afterwards, tuition and accommodation fees are payable in five (5) monthly instalments from 31 March to 31 July. Only in special circumstances will arrangements for deferment of the payment of student fees be granted. In order to limit bad debts to the minimum, accounts of students who have not paid on 31 August or who have not made the necessary arrangements for payment, are handed to lawyers' firms for collection.

Students with unpaid debts of a preceding year are not allowed to register as students unless the necessary arrangements for payment have been made.

4.4.2 Student loans

The primary task of a university is that of education, research and community service, while financing is that of financial institutions. Therefore the University discounted a large section of the student loan portfolio to a commercial bank during 1994. However, the University entered into agreements with several commercial banks according to which these institutions award study loans to students at subsidized interest rates. As a result of not being able to provide security, all students are, however, not guaranteed a student loan according to this scheme. As part of the University's social upliftment programme, loans are awarded to deserving students from the budget. However, funds for that purpose are extremely restricted as a result of the shrinking state subsidy. To satisfy this big and still growing need the establishing of a National Student Loan Scheme is essential.

4.4.3 Bursaries

In the University's duty of stimulating academic growth and as part of the promotion of academic standards, merit and performance, bursaries are awarded to deserving students within budgetary limits. These bursaries are only in acknowledgement of performance and serve as a partial contribution to the meeting of the total study costs. As a result of the shrinking state subsidy these bursaries are not envisaged to be expanded further in future. As part of the University's social upliftment programme, the University has established a bursary loan scheme, starting in 1995 according to which it is possible for a student to convert a part of the loan into a bursary on the basis of academic performance.

4.4.4 Special bursary loan scheme

The PUK Financial Support Scheme (PUKFSS) was established in January 1995 to provide financial support to all admitted students who have limited or no financial means but who have sufficient academic potential to obtain a degree/diploma. Prospective students who have already obtained access to the University, are selected by means of a means test and the initial award is made in the form of a loan. Students can transform part of the loan into a bursary through their academic performance, e.g. for an average of 54%, 30% and for an average of 75%, 80% can be changed into a bursary. The scheme is partly financed by means of a rotating fund by the University from sources other than tuition fees and subsidies.

4.4.5 Bursaries and Loans - 1994 awards

	R'000
Undergraduate bursaries	
From University funds	3 343
Bursaries by outside institutions, Donations and/or trust funds of	4 250
Sub-total	7 600
Undergraduate loans	
From University funds	1 973
From bank funds	1 015
From other funds	282
Sub-total	3 271
Undergraduate Bursary Loan Scheme	
From University funds	487
TOTAL UNDERGRADUATE BURSARIES AND LOANS	11 358
Postgraduate Bursaries	
From University funds	470
From statutory councils	1 300
From other institutions	260
Sub-total	2 030
Postgraduate loans	168
TOTAL POSTGRADUATE BURSARIES AND LOANS	2 198
GRAND TOTAL BURSARIES AND LOANS	R13556

4.4.6 Social involvement programmes (Formal and informal)

4.4.6.1 Formal programmes

4.4.6.1.1 UPS (Unit for the promotion of the teaching of Science)

Target group: Science teaching communities

Aim: To provide service to the Science teaching community, to undertake research on problems in Science teaching and to evaluate service projects. It includes Saturday and Winter schools, teachers' courses, written aids, a study centre, and individual aid to teachers and pupils.

Financial implications:

1986-1993	R453 448
1994	R120 792
1995	R191 000

4.4.6.1.2 Higher Education Diploma (Secondary) [HED(S)]

Target group: Underqualified and unqualified teachers in the previously disadvantaged communities.

Aim: Training/Upgrading of teachers on an after-hours basis over a term of 5 years. Approximately 100 students receive training annually.

1994	R100 000-00
1995	R100 000-00

4.4.6.1.3 Literacy programme which will be integrated in ABE (Adult Basic Education)

Target group: C3 personnel of the university

Aim: To provide a literacy programme for C3 personnel, enabling some of them to become A.B.E. practitioners.

Development of programme:

Levels 1, 2 and 3 serve 160 students at R114 000

Development of courses R29 000

Total budget is thus R143 000

4.4.6.1.4 CTT (Centre for the Training of Trainers)

Target group: Trainers

Aim: The Centre for the Training of Trainers is committed to providing assistance and training to any person who is responsible for the training of adults in the non-formal educational environment.

Financial implications: Courses vary from 1 to 25 days, approximately R225 000

4.4.6.1.5 OPIPUK Programme (Support programme in engineering)

Aim: Slow-stream Engineering course through which study in Engineering is made more accessible without lowering standards. The course content of the first academic year is divided over a two year period and support courses are added.

1993	R491 693
1994	R660 000
1995	R1 078 000

Total student numbers are currently 49

4.4.6.1.6 NS-SBP (Natural Sciences Support and Bridging Programme)

Target group: Black students who have matric exemption, but who do not meet the admission requirements for study in the natural sciences.

Aim: Opportunity to rewrite matric Science and Mathematics in order to meet the minimum admission requirements for study in Natural Sciences.

Budget:

1994 R450 000-00

1995 R185 000-00

Student numbers: 30 per year

4.4.6.1.7 PAA (Programme for Academic Achievement)

Aim: Bridging programme for Business Economics, Economics and Accountancy in co-operation with the Technical College.

Budget: R100 000 per year

Student numbers: 30

4.4.6.1.8 Nyologang Educare

Aim: Training of day mothers and educarers and provision of day-care centres. At present 152 day-care centres are controlled and managed in the North West Province.

Budget:

1994 R381 467

1995 R764 754

4.4.6.1.9 North-West Education Foundation Educare (NWEF)

Aim: This programme has a close link with Nyologang and is offered at Stilfontein at the abandoned Toni shaft.

Budget: R450 000

4.4.6.1.10 SENRIO (Centre for Regional Development)

Aim: The Centre was established to do research on regional development, to give advice and to undertake consultation services regarding development issues. The centre has a multi-disciplinary approach and operates on a matrix system.

Budget: R200 000 p.a.

4.4.6.1.11 CTSE (Centre for Traffic Safety Education)

Target group: Women who follow the course for domestic workers at the Potchefstroom Technical College.

Aim: To teach the women, who are also mothers, the basic road safety rules which apply to pedestrians.

To train mothers to train their children according to the "Child Traffic" programme to be road safety aware of and to study the basic traffic rules.

Financial implications: The programme is presented free of charge by the CTSE staff and equipment and education material of the centre are used.

Driver training course in co-operation with the PU for CHE Students' Rag Community Service

Target groups: High school pupils of Ikageng

Objectives: Firstly to assist pupils in obtaining learner's driver's licences.

Secondly to train the pupils to pass the driver's licence test.

Financial implications: The lecturers and instructors of CTSE offer the course.

The training vehicles and fuel are provided free of charge by the sponsors of the Schools' Driver Training Programme.

The pupils pay for the learners' and driver's licences tests themselves.

Entire budget 1995: R15 000

4.4.6.2 Informal programmes

4.4.6.2.1 Saturday schools

Aim: Supplementary teaching in matric subjects. Pupils have a choice of three subjects from a total of nine. These Saturday schools serve as preparation for the matric examination.

Budget:

1993	R159 449
1994	R148 468
1995	R103 850

Number of pupils ± 800

4.4.6.2.2 Legal Aid Centre

The Legal Aid Centre operates four branches in Potchefstroom, Vereeniging, Witbank and Midrand (Ivory Park and Tembisa).

Aim: To supply free legal aid to persons with an income of less than R1 000 per month. A means test exists which determines whether an individual may make use of the services.

Budget:

1994	Potchefstroom	R342 474
	Vereeniging	R131 000
	Witbank	R220 000
	Total	R693 474
1995	Potchefstroom	R412 146
	Vereeniging	R114 300
	Witbank	R175 700
	Ivory Park	R102 200
	Total	R804 346

4.4.6.2.3 Winter Schools

Aim: A course over a period of two weeks to prepare matriculants for the final examination. Winter Schools are presented in areas where Saturday Schools cannot be presented due to distance.

Budget:

1993	R147 002
1994	R135 680
1995	R119 120

4.4.6.2.4 Street Law

Aim: To inform and train pupils with regard to basic human rights.

Budget:

1994 R98 301

1995 R159 290

Hundreds of children are involved through this programme.

4.4.6.2.5 Music Workshop

Aim: To expose forty primary school pupils from the disadvantaged communities to music and music appreciation for two hours per week.

Budget:

1994 R5 000

1995 R5 990

4.4.6.2.6 Community Pharmacy

Aim: The Faculty of Pharmacy operates a community pharmacy in Promosa with a view to consultations and the provision of medicine (receives R1 per prescription and medicine is sponsored). Approximately 150 persons weekly receive medicine at that pharmacy.

Budget:

1995 R31 930

4.4.6.2.7 Human Movement Science

4.4.6.2.7.1 Motor teaching to day mothers (Joint venture with the Nyolong Centre)

Target group: Nursery schools, teachers and day mothers from Ikageng, Promosa and Mohadin.

Aim: Training of nursery school teachers and day mothers with regard to the development of motor skills and movement programmes for the toddler.

Budget:

1995 R5 000

4.4.6.2.7.2 Rugby development

Target groups: Ikageng, Promosa: 10 year old boys.

Aim: Talent identification in rugby for 10 year old boys and training of identified players.

Budget:

1995 R10 000

4.4.6.2.7.3 Athletics development

Target group: Young athletes in Ikageng, Promosa and Mohadin

Aim: Identification of talent and advancement of athletics as well as establishment of formative schools with regard to athletics items.

Budget:

1995 R7 000

4.4.6.2.7.4 Rugby development in Carletonville

Aim: Development of rugby in disadvantaged communities in the Carletonville region.

Budget:

1995: R25 000

4.4.6.2.7.5 Training of Sports First-Aid officials (Sports trauma)

Aim: Training of sports officials and organisers with regard to sport trauma

Target group: Sports officials from gold mines and others from Potchefstroom

Budget:

1995 R6 000

4.4.6.2.7.6 Swimming development

Aim: Swimming development for young children from Ikageng, Promosa and Mohadin.

Budget:

1995 R4 000

4.4.6.2.7.7 Cricket development

Aim: Cricket development and identification of talent in children from Ikageng, Promosa and Mohadin.

Budget:

1995 R15 000

4.4.6.2.7.8 Swimming development for students at Teachers' Colleges in the North-West as well as training of life-savers among sports administrators and officials in the North-West.

Budget:

1995 R30 000

4.4.6.2.8 Nutrition and Family Ecology

4.4.6.2.8.1 The knowledge and attitude of obese black women with regard to weight control

Target group: Obese black women

Aim: To change the attitude of obese black women with regard to weight loss.

Financial implications: approximately R10 000

4.4.6.2.8.2 Factors which affect co-operation of black patients in the treatment of hypertension

Target group: Obese black women

Aim: Hypertension and particularly strokes can be prevented by means of weight loss. Weight loss has an influence on blood pressure, glucose toleration and blood lipid levels.

Financial implications: R10 000

4.4.6.2.8.3 Women's Outreach Foundation Ten Programme

Aim: Basic educational life skills programmes for underdeveloped women.

Cost: Approximately 20 hours each of four lecturers per year = R5 000

4.4.6.2.9 Nursing course for home care

Target group: Black women who do home nursing

Aim: The purpose of the course was to provide basic training to a group of selected persons which will enable them to provide skilful, safe and efficient basic care at home to all patients over the entire age spectrum under supervision and guidance of a community nurse.

Financial implications: R7 000 per course (two per year) from 1993 to 1995

4.4.6.2.10 Students' Rag Community Service (SRCS)

Aim: Students render voluntary free services to communities in Ikageng, Promosa and Mohadin. Services include, among other things, the following:

- eisteddfods
- environmental conservation
- library
- evangelization
- aid to the handicapped
- leadership development
- sports coaching.

Budget: R52 381

4.4.6.2.11 Promosa Clinic

Target group: Inhabitants of Promosa.

Aim: Free medical services are rendered on Monday and Tuesday evenings by Dr. P. J. Plaatjies, lecturer-physician of the Department of Pharmacy Practice. Approximately fifty patients are treated per week.

Financial implications: R1 000-00 *Dr. Plaatjies' services are free of charge.*

Total budget for formal and informal programmes: R4 464 661

4.5 Rationale for co-operation between academe and industry

4.5.1 The international experience

Over the centuries the contributions of universities to the community have been seen as one in which the development of the intellect dominated the science and thoughts. In the modern world these contributions are still regarded as important, but the external environment of universities has changed almost dramatically over the past two decades.

In the first place the transition from the industrial to the information era has brought about a big change in the nature of institutions. The emphasis is increasingly placed more on expertise and the availability of information. Institutions are therefore increasingly served by expertise or knowledge workers, and organisations change from larger, hierarchical structures to smaller and more equalized "pools of expertise". The university thus still has a unique function, but is no longer the only source of knowledge and research in the community. This has resulted in the need for exchanging knowledge and research results between academe and industry.

Secondly universities world-wide have undergone a period of rationalization in the eighties, which exerted financial pressure on university authorities. Universities could thus no longer finance activities only by means of government contributions and the need to generate external funds has consequently increased. The economic recession further required overlapping and waste to be limited; systems to be made more efficient; sources to be utilized optimally; and possibilities for the generation of external sources to be exploited, **without neglecting the traditional teaching and research task**. In fact, the partnership with the industry is specifically directed at causing cross-pollination and generating external funds to stimulate teaching and research.

As a result of the above-mentioned and other reasons academic-industrial co-operation has increased dramatically in the USA, Europe, the United Kingdom and other parts of the world such as India and South-East Asia. **Increasingly a balance is aspired to between the traditional values and ideals of a university and its new role as partner of industry.** Kelly (1992:162) states that: 'Part of the great debate as to the role of the modern university concerns the arrangement that these traditional liberal ideals, where intellectualism and scholarship hold primacy in the mission of an university, are not incompatible with the joining of forces between the university and the world of business outside its walls'. By means of co-operation the academic world and industry hold the key to technological development and technology-transfer in the major sectors of the economy. In fact, it clearly appears from the literature that the partnerships between the central, regional and local government, the private sector and the universities contain several advantages for regions and local development.

Several **advantages** for the private sector and industry arising from co-operation include:

i) Advantages for the business world:

- They attract better graduates.
- Obtain university training which better provides in their needs.
- Short courses ensure the regular upgrading of knowledge.
- Access to the knowledge, technology and research capacity of the university results in the private sector being provided with the most recent knowledge and information.
- Co-operation indicates the responsibility which businesses/industries display towards the community.

ii) For the universities there are the following advantages:

- They become local sources of economic growth as a result of the link with institutions which generate new technology. Universities consequently also attract more students.
- There is intellectual profit for universities in sharing in the expertise and infrastructure of the private sector.
- Financial advantages resulting from co-operation.
- Sponsorships.
- Commercializing of research outputs.
- Students who are exposed to practice.
- Consultation work and professional involvement of the lecturers in the private sector result in staff development, upgrading of knowledge and experience in the solving of practical problems.
- Experienced managers and board members make their knowledge available to universities, which means a lot for the development of the latter.

There are, however, also several problems associated with academic-industrial co-operation, including:

- Different values, attitudes and differences in the sense for urgency.
- Academe puts the emphasis on basic research, freedom, etc. in contrast to industry which puts the emphasis on applied research.
- Strong discipline-directed research in the academic world in contrast to the increasing demand for multi-disciplinary research in industry.
- Reluctance of academe to become involved in entrepreneurial activities.
- A lack of well-developed communication channels between academe and industry.
- A prescriptive manner of training which repeats certain methods from generation to generation.

There can be no doubt that there is a large difference of culture between the academic world and industry. It would be a huge mistake to ignore these differences, and academe will have to apply better management practices with regard to centres of expertise etc., while industry must develop a better understanding of the methods and value system of a university.

Experience elsewhere in academic-industrial co-operation indicates a number of do's and don'ts. Before attention is given to these, it is important to take note of some requirements for success:

- Emphasize personal relationships.
- Ascertain that there is "two-way traffic", that both benefit from it and that it is a matter of "give and take".
- Be patient - high quality relationships require time to develop.

- Be flexible and act on opportunities.
- Think big - the reason for the existence of the co-operative relationship is to achieve something which the individual partner could not achieve on his own.

Several matters must be attended to in order to assure successful co-operation, including the importance of

- acknowledgement of a continuum of possibilities between basic research and product development - ascertain that both parties understand what is expected and make sure that the commitment exists to attain it;
- select partners with caution in order to overcome differences between academics and manufacturers;
- career incentives for co-operation - the incentives must be known;
- technology-transfer which occurs most successfully via graduates, who want to achieve success in industry;
- "intellectual property rights," which must receive attention in advance;
- publicity which must be given to success stories.
- **Industry** must affirm the commercial interests in a project, make sure that academe experiences it as a benefit, and ensure that success can be achieved in quantifiable forms. **Academe** must ensure that resources applied externally will be successful, broaden its culture in such a way that there is understanding for industrial partners; and decide beforehand how closely it wants to move to industry. On the obverse side,
- don't allow organisations to come between individuals who want to collaborate;
- don't expect that academics (because of academic obligations) can work at identical time schedules as employees in the industry;
- don't under-emphasize opportunities for publications;
- don't move/change more people than absolutely necessary - partnerships take time to develop.

4.5.2 Forms of academic-industrial co-operation

Academic-industrial co-operation takes several forms: Examples include centres of excellence; entrepreneurship development (especially commercializing of research and technology); centres of innovation/creativity; contract research; exchange of personnel and expertise; co-operation on the terrain of research and development (this includes development and transfer of technology); the modification of technology; improvement of productivity; consultation services; sponsored research and training and science agreement.

Three schools of thought on academic-industrial co-operation can roughly be differentiated:

- The internalist school which rejects interaction and expects discipline-directed departments to increase industry-relevant research and development work.
- The externalist school which acknowledges the need for specialized interaction, but which insists on operating it separately from the academic system.
- The integrationalist school which ascribes the failure of academic-industrial interaction to excessive bureaucratic conservatism at universities. They argue in favour of a new concept concerning the university system - one in which the generation and transfer of technology is regarded as a central instead of a peripheral function. According to this model hybridisation takes place which is generally accepted as the best solution.

4.5.3 The Indian Model for interaction between the universities, industry and national laboratories

The so-called Swaminadhan Model for co-operation between universities, the industry and national laboratories in India is explained in Figure 14. This model was developed to develop a symbiotic relationship among the above-mentioned three entities. As can be gathered from the

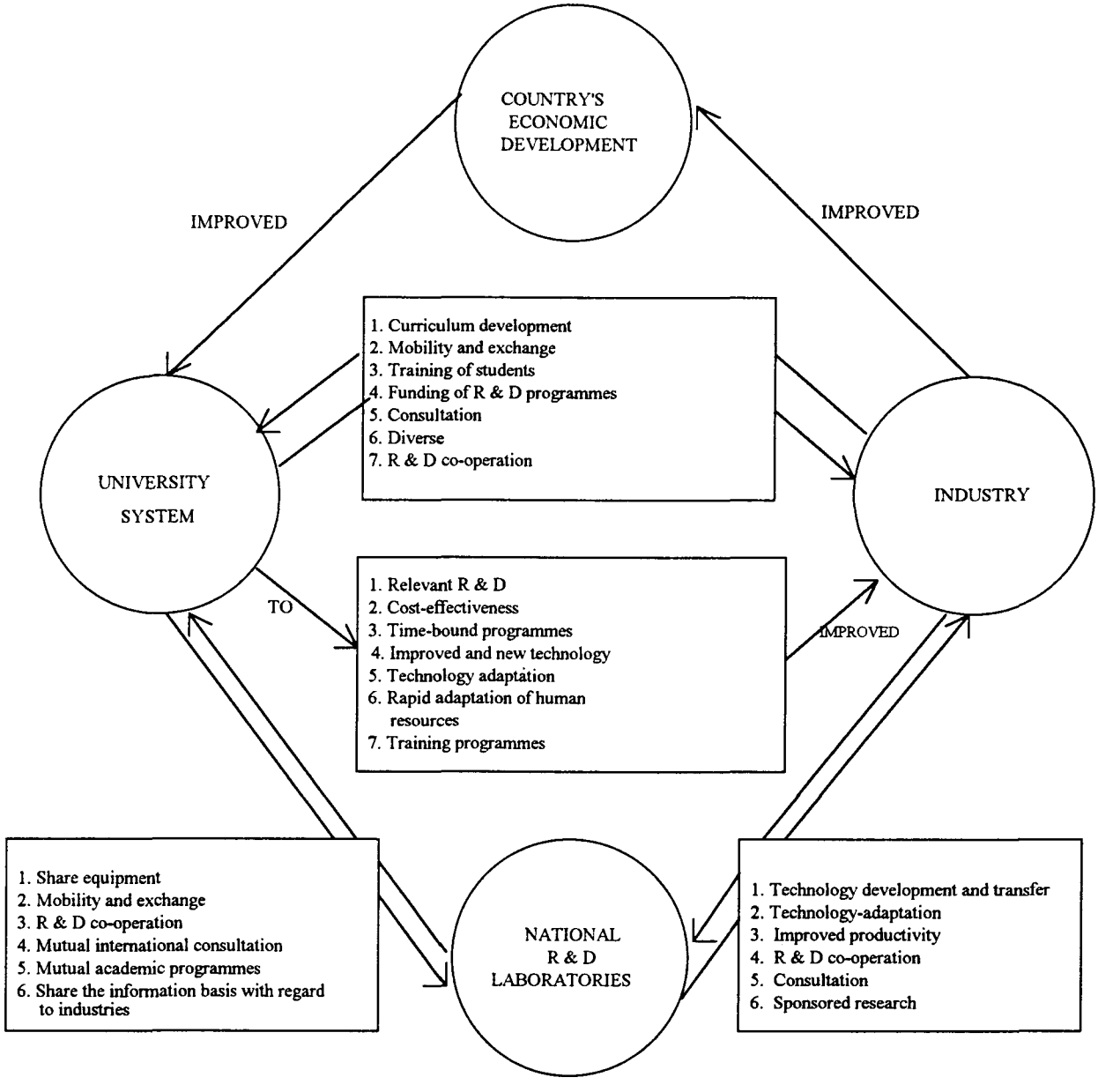
diagram, several advantages can arise for the University, industry and for national research councils from the three-way interaction. The economic development of the country is set as the highest aim. It is interesting to note that a Bureau for Industrial Consultation and R & D activities was established at the Jawaharlal Nehru Technological University to promote interaction with industry and other sectors and to learn from their experience, to improve confidence in the capacity of the university, to receive consultational assignments and to co-ordinate the execution of assignments between schools and departments (Swaminadhan, 1993).

4.5.4 Recommendation:

The South African universities already have interaction with the private sector on several levels. Above, the theoretical basis for such co-operation is briefly sketched. The model a particular university chooses will be determined largely by the particular expertise within each university and the readiness of the university to enter into this co-operation. The importance of this partnership approach for the future of higher education in our country can, however, not be ignored and the National Commission for Higher Education should take notice of this.

Figure 14

Interaction between universities, industries and national laboratories in India



4.5.5 Centres of Excellence

The one variant of above-mentioned forms of academic-industrial co-operation which has already received considerable attention at the PU for CHE, is the centres of excellence. **It is important to note that a centre of excellence is not regarded as a formal university structure such as a research institute, but is rather a horizontal joining of a variety of experts from different departments at the University and as a rule also experts from outside the University in inter- and multi-disciplinary projects.** The horizontal integration which happens in this way is then also an attempt to utilize that existing competitive advantage the PU for CHE has in particular areas, to the advantage of the University in a strongly multi-disciplinary/inter-disciplinary way and to make it useful in the interest of an important developmental need on regional or national level. Concerning the former at the PU for CHE, SENRIO (Centre for Regional Development) is an example at the PU for CHE. It is supported significantly by GENCOR. Two examples of centres of excellence in which the PU for CHE is directed towards needs on national level in partnership with the private sector, are the SASOL Centre for Chemistry and Separation Technology and the Perskor Centre for Business Communication.

A Centre of Excellence must strive towards **quality, relevance** and **cost-effectivity** as aims and must keep in mind that both current and capital expenditures are involved in the operation of such a Centre. It is further important that a centre of excellence must make a contribution to the addressing of research and development problems, the training of human resources, the promotion of entrepreneurship and the generation of external funds. The following outputs can typically be delivered by centres of excellence:

- Publications
- Product development
- Patents
- Technology-transfer
- Delivery of students
- Expert contributions/scientific excellence
- Impact nationally and internationally
- Continued training courses

Before the establishing of a Centre of Excellence is finalized, the following pertinent matters should receive attention:

- the importance and relevance of the theme on national and/or regional level;
- market opportunities which can be utilized;
- whether the University has a competitive edge in the chosen field;
- whether the University does indeed possess excellence in that field;
- whether excellence can be obtained from elsewhere through partnerships;
- efficient management of such a centre;
- whether external funds and particular investment in the University can be raised;
- what the availability and status of existing infrastructures are and whether a new infrastructure is required;
- how the international and national networks can be extended and/or re-established;
- it must be possible to strive for quality, relevance and cost-effectivity (as mentioned above);
- the head of a Centre of Excellence should be nationally and internationally acknowledged.

Centres of excellence are typically **managed** within a **matrix system** to utilize existing resources and infrastructure optimally. A further distinction between a centre of excellence

and an institute is that the former should have **research, training and consultation service functions** to be able to optimize the interaction between academe and industry as well as the maximum utilization of market opportunities.

From the above-mentioned discussion it should be clear that centres of excellence must comply with high requirements, be managed well, be financially successful with a head or director who has a high international and national reputation. Therefore it is not advisable for a university to establish a large number of these centres. A preliminary investigation can involve the following phases:

Identification: By experts of the University, industry/private sector or public sector; or by an interaction of academe/industry.

Pre-evaluation phase: During this phase experts of the University do a preliminary investigation into the viability of the identified theme and submit a preliminary report/memorandum. If the proposal seems to be viable, mandate is given for further examination and an evaluation report.

The evaluation phase: Full investigation into the viability of the proposal. Particular attention is given to the criteria for centres of excellence as explained above. Particular attention must also be given to the financial management, manpower and management dimensions of the proposal. If the report is approved, the negotiating phase can be entered.

Negotiating phase: At this stage the University (Management and experts) negotiates with interested parties in the industry/private sector concerning the conditions associated with the establishment of a centre of excellence, possible investments for the University, exchange of manpower, upgrading of infrastructure, etc.

Implementary phase: If all the requirements are complied with, the establishment of a centre of excellence is initiated. Afterwards it is essential for the centre to be managed well within a proper management structure created for that purpose.