

List of abbreviations

AGOA	African Growth and Opportunity Act
ARD	Agricultural Research Department
ATS	Appropriate Technology Section
BNP	Basotho National Party
CBL	Central Bank of Lesotho
CSAVE	Consultative Committee on Science and Technology Education
DST	Department of Science and Technology
GDP	Gross Domestic Product
GNP	Gross National Product
ICT	Information and Communication Technology
ISI	Institute of Scientific Information
LCST	Lesotho Commission of Science and Technology
LITF	Lesotho Innovation Trust Fund
MA	Ministry of Agriculture
MCST	Ministry of Communications, Science and Technology
MET	Ministry of Education and Training
MTCE	Ministry of Tourism, Culture and Environment
MFA	Multi Fibre Agreement
NCIR	National Centre for Innovation and Research
NHTC	National Health Training College
NUL	National University of Lesotho
PRS	Poverty Reduction Strategy
PUSET	Public Understanding of Science, Engineering and Technology
R&D	Research and Development
RIC	Regional Innovation Centres
S&T	Science and Technology
SKA	Square Kilometre Array
SMME	Small Scale and Medium Enterprises
STIC	Science and Technology Information Centre
TVET	Technical and Vocational Education and Training
UNDP	United Nations Development Program

1. The political environment

The Kingdom of Lesotho, formerly known as Basutoland before independence, is a small, landlocked and mountainous country in Southern Africa. It gained political independence from the British Colonial Protectorate administration on 4th October 1966. The Basotho National Party (BNP) ruled for the first two decades. King Moshoeshoe was exiled in 1990, but returned to Lesotho in 1992 and was reinstated in 1995. After 7 years of military rule, the constitutional government was restored in 1993. In 1998, violent protests and a military mutiny following a contentious election prompted a brief but bloody intervention by South African and Botswana military forces under the aegis of the Southern African Development Community. Constitutional reforms have since restored political stability and peaceful parliamentary elections were held in 2002.



2. Country characteristics

2.1 Basic economic outlook

Lesotho has no substantial natural resources other than water. More than 85 percent of the population of 2 million lives in rural areas mainly engaged in agriculture and informal activities. Agriculture contributes about 15 percent of GDP. Until recently, incomes depended on family members working in mining and other jobs in South Africa, which have been declining. As the number of mineworkers has declined steadily over the past several years, a small manufacturing base has developed based on farm products that support the milling, canning, leather, and jute industries and a rapidly growing apparel-assembly sector.

A political crisis in 1998 slowed growth, but by 2000 the positive impact from the construction of the Lesotho Highlands Water Project, which supplies water to South Africa and a small but rapidly growing manufacturing sector (textiles) contributed to a surge in economic growth. Because of the African Growth and Opportunity Act (AGOA) and duty and quota-free access to US markets, the garment industry became the largest single employer. Unfortunately, recent shocks to the sector, brought about by the phasing out of quotas under the Multi Fibre Agreement (MFA), are expected to have a negative impact.

The economy is still primarily based on subsistence agriculture, especially livestock, although drought has decreased agricultural activity. The extreme inequality in the distribution of income remains a major drawback. Lesotho has signed an Interim Poverty Reduction and Growth Facility with the IMF. The Bank's Board endorsed the Poverty Reduction Strategy (PRS) and Joint Staff Advisory Note on September 8, 2005. Some of the basic economic indicators are summarized in Table 1.

Table 1: Selected economic indicators of Lesotho

BASIC ECONOMIC DATA	
GDP	\$1.362 billion (2005 est.)
GDP-Growth	0.8%
GDP per capita	\$2 500
Inflation Rate	5.2%
GDP composition per sector	
agriculture	15.4%
industry	44.2%
services	40.4% (2005 est.)

Source: Compiled from CIA Fact Sheet and US PolitInfo Websites

2.2 Demographic characteristics

The following table is a summary of the country's geopolitical characteristics of Lesotho.

Table 2: Summary of geographic and demographic characteristics of Lesotho

GEOGRAPHY	
Area	Land 30 355sq m
Cities	Capital: Maseru, Major metropolises: Berea, Butha Buthe, Leribe Hlotse, Mafeteng, Maseru, Mohale's Hoek, Mokhotlong, Qacha's Nek, Quthing, Thaba-Tseka
Climate	Temperate; cool to cold, dry winters; hot, wet summers
PEOPLE	
Nationality	Basotho
Population	2.2 mil
Religions	Christian 80%, Indigenous beliefs 20%
Language	English (official), Sesotho, isiXhosa and isiZulu
Education	Literacy: 84.8%
Health	Infant mortality rate:87.24 deaths/1,000 live births HIV/AIDS adult prevalence rate: 28.9% (2003 est.)
Workforce	Agriculture: 86%, Industry and services: 14%

Source: Compiled from CIA Fact Sheet and US PolitInfo Websites

3. Science and technology system¹

3.1 Governance of science and technology

The Ministry of Communications, Science and Technology (MCST) published the National Science and Technology Policy for Lesotho in 2003. The formulation of a National Policy for Science and Technology was derived through a long and intensive consultative process that engaged all key stakeholders from all occupations. The National Policy is a key instrument for a vibrant and fully functional national system of innovation, science and technology. Lesotho Science and Technology Policy embody Lesotho's collective values, virtues, wisdom, history, tradition and diversity. It advocates for science and technology as sole providers of an enabling environment for expression of the shared vision and aspiration of the people of Lesotho. The policy also seeks to support the national growth targets, in terms of increasing contribution to local value added products, export, production increase and integration of new and emerging technologies with indigenous technologies. These science and technology related targets should be achieved through an enhanced knowledge base, which are Research and Development including innovations, entrepreneurial and skills development.

3.1.1 Ministry of Communications, Science and Technology

The MCST has been given the mandate to coordinate science and technology development in Lesotho, and to oversee the evolution and operation of an effective S&T policy and a national innovation system. In line with this mandate, the Ministry will establish appropriate instruments to promote, motivate, guide, fund, facilitate and monitor S&T institutions, including new and on-going research programs. To achieve this mandate, the Department of Science and Technology (DST) is given the responsibility to:

- spearhead and coordinate the S&T policy implementation process
- and to establish the legislative and institutional framework

3.1.2 Department of Science and Technology (DST)

The DST is mandated to formulate and implement policies and programs that promote growth of science and technology and to ensure an enabling environment in which technological development makes a meaningful contribution to a better quality of life of the people of Lesotho.

The DST acts as a coordinating body, a focal point for government and a liaison point for various public and private S&T stakeholders. They also review, assess and monitor S&T policy issues of national interest and spearhead necessary studies and technology audits to facilitate the continuous and equitable development of science and technology throughout the country. It is supposed to program resources with the appropriate administrative and technical agencies and monitor regional and demographic impacts of science and technology activities. Working independently or with or through other S&T facilities, the DST ensures that all S&T initiatives comply with national, regional and international protocols, and are in line with appropriate national environmental standards, national regulations and take into consideration gender, youth and community concerns, including the indigenous knowledge systems and practices. The DST serves as a secretariat for the Advisory Commission of Science and Technology.

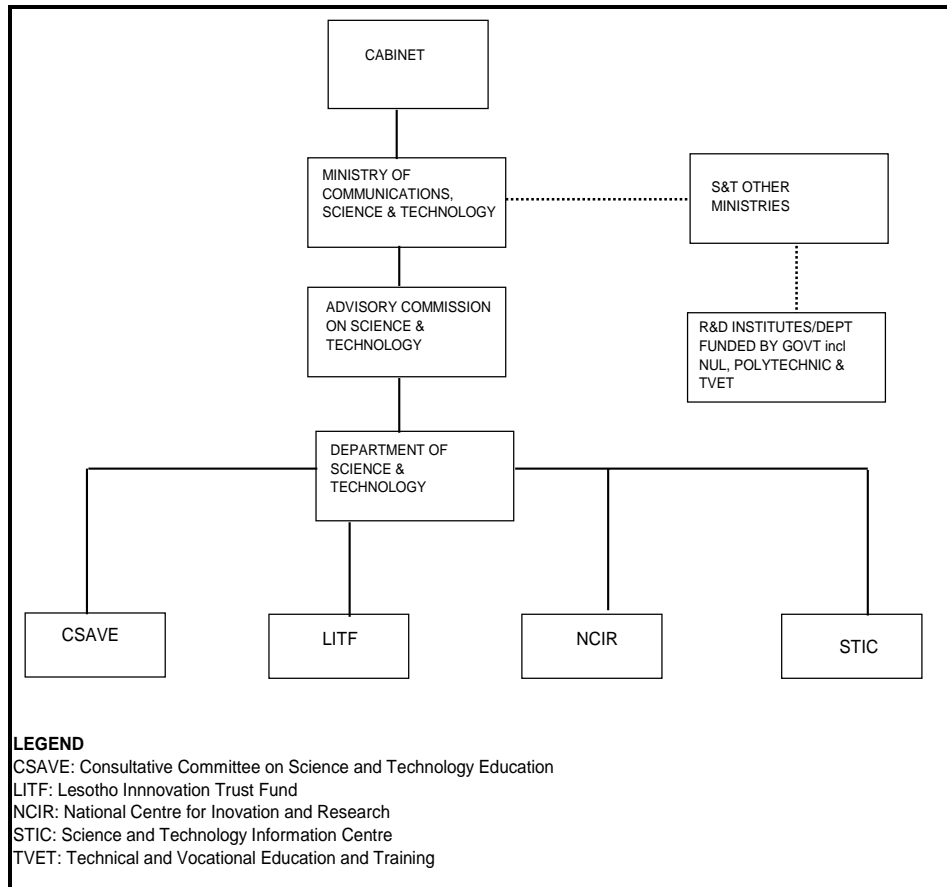
The S&T policy also recognizes the Appropriate Technology Section (ATS) as a fundamental tool for government to target public technical support to small-scale, informal, indigenous enterprises including the dissemination of appropriate technologies to the rural communities in the advocacy of addressing their needs. Therefore, the ATS has been incorporated with the MCST. The S&T policy anticipates that the role of ATS will be expanded to include serving as

¹ Adopted from Lesotho Science and Technology Policy

a National Centre for Innovation and Research (NCIR) within the context of an effectively operational Lesotho Innovation System.

The institutional arrangement and linkages among the departments and key agencies are presented schematically in the following diagram.

Figure 2: Simplified map of the institutional arrangements at national level



3.1.3 *Lesotho Commission on Science and Technology (LCST)*

The LCST is one of the two new institutions within the S&T system. It is an overarching, high-level S&T policy advisory body reporting to the Minister. Its responsibilities are to:

- manages the S&T policy and innovation process,
- provide S&T advice to government and
- oversee the S&T policy implementation.

The LCST is composed of competent S&T-related personalities and representatives drawn from the private sector, para-statal, government ministries and other S&T-relevant organizations.

3.1.4 *Lesotho Innovation Trust Fund (LITF)*

The LITF is the other new institution within the S&T system. It is an essential component of the S&T policy instrument to be established and supervised by the LCST. It supports the implementation of Lesotho's S&T development.

The fund is responsible for:

- administering the S&T activities
- developing the mechanisms to solicit, receive, mobilize and oversee the efficient allocation of and accounting for the funds provided for research, science and technology projects.

Allocated funds are used strategically to support public good research and other S&T related activities. Legislation will be introduced after consultation with major S&T benefactors, to put in place rules, procedures and criteria for accessing, allocating and accounting for the S&T funds.

3.1.5 *ICT²*

The Government of Lesotho specifically recognizes the important role played by Information and Communication Technology (ICT) as critical enabler in the overall development process of the country. ICT is seen to provide access to information and if appropriately utilized, bridges the existing gaps through integration of information systems with existing indigenous knowledge systems and practices. The national commitment is well exemplified by clearly articulated statements in the 2000 Report of the National Dialogue on the development of a National Vision for Lesotho that states that information and technological research and innovation make ICT services a prerequisite for Lesotho's socio-economic development.

In general, both national networking and the use of ICT have been quite poor when compared regionally and internationally. The internet service providers are currently three in the whole country and approximately, there are 43,000 internet users³ out of the population of 2.2 million.

Telecommunication services are concentrated in towns and urban areas around Lesotho, while the most vulnerable groups that are situated in the mountainous areas and which constitute the larger population, do not have access to these services (except for radio services which cover almost every part of the country). There are about 37,200 lines available with an estimation of 60 persons per line. It is also estimated that 9 out of every 1000 had access to telephone mainlines in 1995 and it only increased by one to 10 out of 1000 in 2000 while a rapid increase is evidenced when compared to mobile phone users, which was from zero in 1995 to 10 users out of every 1000 people in the year 2000.

To redress the situation and break the existing "digital divide", the Government of Lesotho took collective measures and efforts towards enhancing ICT as an integral part of the National

² Extracted from a report on "Information and Communication Technologies in Lesotho"
³ 2005 estimate from the CIA Fact sheet

development framework of the ongoing National Vision, the Poverty Reduction Strategy Paper as well as the Public Sector Improvement Reform Program.

3.1.6 S&T Priorities

The list below is a list of key sectors and products that were identified at an S&T stakeholders' conference in 2000 for S&T focus.

- Renewable energy
- ICT programs
- Biotechnology
- Traditional and indigenous technologies
- Tertiary manufacturing
- Animal products
- Water, medicine and cosmetics
- Horticulture

3.2 Science and technology landscape

3.2.1 R&D performing institutes and centers of excellence

The following table details the proposed agenda for R&D performing institutes.

Table 3: Agenda for Research-Oriented S&T Institutes

R&D Institutes	Primary Objectives	Research	Specific Outputs	Research	Main providers/supplier of R&D services
NCIR	R&D and innovation		Research, product innovation and S&T advice		All RDIs receiving/using public funds
NUL	Teaching, material and product development	research, and product development	Management and S&T Skills, technical publications, technical advice, laboratory support, new materials & process innovations.		Science & education faculty, Agriculture faculty, Social sciences & Health
Lerotholi Polytechnic (LP)	Process & procedure and product improvement; training, extension service and technical advice.		Technical and vocational skills, technical publications, community outreach services and appropriate technology solutions.		Science & Engineering Schools, Agriculture, Domestic Sciences and Arts

Table 3 Continued

R&D Institutes	Primary Objectives	Research	Specific Outputs	Research	Main providers/supplier of R&D services
Ministry of Agriculture (MA)	Increased on-farm productivity, Better marketing facilities & higher value added output and income.		New processes, new products, new uses for products, new and appropriate technologies and improved farm practices.		Research divisions in the ministry and all outstations and extensions offices.
Ministry of Education & Training (MET)	Increased life and occupational skills; business, vocational and entrepreneurial training.		Enlightened educational policy & programs, certification, new courses & teaching materials methodology, and new publications.		All tertiary level teaching and research institutions, technical, trades and vocational training centres.
ATS	Higher rate of acquisition, use transfer and popularization of appropriate technologies for steady SME growth		Procurement, development & demonstration of appropriate technology choices, designs and prototypes. Skills upgrading & technical advice.		All divisions of the ministry dealing with labour and community-related activities. All ATS divisions and RIC/RDC attached.
Ministry of Tourism, Culture & Environment (MTCE)	Increased local use and management of natural and environmental resources. Increased & more reliable & regular S&T and environmental information.		Stronger domestic linkages, value added output, more trade and market intelligence information. Daily forecasts and record of S&T information, environmental impact and risk assessments.		All divisions and outreach offices of the ministry. All divisions dealing with environment & all meteorology divisions and outstations.
Regional Innovation Centres (RIC)	Better use of local plants, materials & indigenous skills and technologies.		Practical workshops, demonstration and training sessions for rural-based SMEs.		All established RIC and RDC offices.

Source: Lesotho Science & Technology Policy Document

3.2.1.1 Higher Education Sector

3.2.1.1.1 National University of Lesotho (NUL)

The NUL is the only university in the Lesotho's tertiary education system. It is an autonomous institution under the general direction of its governing council reporting to the Ministry of Education. NUL's multidisciplinary science facility provides an ideal structure for spearheading Lesotho's science teaching and research efforts.

With reasonably well-equipped laboratory facilities, the university's S&T departments do not currently operate as a homogenous unit for teaching and research. S&T staff complement is modest. NUL will require infrastructural changes for it to be able to respond to national

development priorities as envisaged in the S&T policy. Its budget will need to be boosted and rationalized to support an expanded S&T curriculum, the required teaching and research staff complements. The institution has a pivotal role to play in preparing and developing the nation's high-level technical and professional work force, and to reduce the S&T work force gap presently existing in the business and government sectors. Its contribution, in terms of functional research outputs, technical advisory and investigative services to industry, commerce and government, needs to be packaged and marketed. However, NUL needs to appraise its current S&T programs, courses and research outputs to align them with the skill needs and trends of the Lesotho job market.

Greater emphasis and more incentives are needed to spur S&T innovation at NUL, and to increase the impact of multidisciplinary and inter-faculty S&T teaching and research. This will also facilitate NUL's leadership in local publications, entrepreneurial and management training to S&T professionals and business leaders, as delivered by national and regional centres of excellence. The S&T policy envisages that NUL will continue to facilitate student mobility between S&T programs and courses offered by it and sister training institutions, including the polytechnic and other training colleges. Similarly, the university is expected to provide proactive leadership in S&T matters of national concern to government and industry.

3.2.1.1.2 Lerotholi Polytechnic (LP)

LP is also an autonomous institution under the general direction of a governing council. It is a principal science and technology institution with the special mandate of training and developing Lesotho's technical, commercial and vocational skills base in technical and professional competencies. Its programs will have direct functionality to work place requirements in technological areas as well as practical for research and innovations in science and technology and commerce. The polytechnic is particularly tasked to provide programs that are practical and have direct impact on the various communities it serves. This requires it to work closely with industry, commerce and government to deliver a wide range of disciplines and skills to match the competitive dynamics of Lesotho's labour market. LP will also assist as required in the accreditation of technical and vocational programs, with the national quality assurance bodies.

The Polytechnic will focus its attention on building citizen's competencies in engineering, technological, commercial and other functional areas of relevance to the market. LP will also develop and strengthen links with the technical, vocational and tertiary institutions and industrial enterprises locally and regionally. As an institute approved for research, the polytechnic will have full access to the Science and Technology Trust Fund for innovations.

3.2.1.2 Technical and Vocational Education and Training (TVET)

TVET is a leading agency on technical and vocational training within the Ministry of Education. It is charged with the development of training of persons for skilled occupations to meet poverty alleviation and socio-economic development needs.

TVET in Lesotho will be successful if it is creative and responsive to the requirements of the labour market through research and development initiatives in order to provide competent, effective and efficient labour force. TVET system is supposed to develop and assess the achievement of national technical and vocational standards to meet both industrial and educational requirements. The main strategy for TVET is to introduce technical and vocational education at all levels of education and training, in order to produce a more skilled labour force that will be competitive nationally, regionally as well as internationally. Emphasis has to be put on the incorporation of science, technology, research and development in the curricula. Technical and vocational training is a powerhouse of skills development. Hence, it can be regarded as a vehicle for technologically based entrepreneurship and industrial development process.

3.2.1.3 Major research institutes⁴

There is only one research institute in the Ministry of Agriculture and Food Security. However, the type of research done is a troubleshooting type of research. The output is in the form of new products that are not well documented.

3.3 Human capital for S&T

3.3.1 Tertiary education enrollment

The number of students enrolling at the NUL has increased over the years. The breakdown of the student population by faculty is shown in Table 4 below.

Table 4: Undergraduate student enrollment in NUL for years 2000-2003

Faculty	2000/2001	2001/2002	2002/2003
Agriculture	379	287	402
Education	655	747	886
Health Sciences	-	17	21
Humanities	322	361	440
Law	293	416	598
Science & Technology	365	355	481
Social Sciences	798	984	1 239
Total	2 812	3 165	4 067

Source: MCST document prepared by DST

3.3.2 Masters and doctoral enrolments

The postgraduate information at the NUL is broken down by faculty and gender; however it does not distinguish between masters and doctoral enrolments. Table 5 shows a very poor number of enrolments especially for females. There are only 2% of students in the science and technology faculty.

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From a document by DST entitled "Lesotho S&T Indicators", published in 2003

Table 5: Composition of Postgraduate Students in 2002/3

Faculty	Female	Male	Total
Humanities	2	4	6
Law	37	63	100
Social Sciences	8	7	15
Science & Technology	0	3	3
GRAND TOTAL	49	80	129

Source: MCST document prepared by DST

3.3.3 *Enrolments of Basotho abroad*

Most of the students in Lesotho leave the country to further their studies abroad mostly in the Republic of South Africa (RSA). This is due to lack of a wide range of programs offered at NUL. The number of students enrolled in South African institutions in 2003 is shown in Table 6 below.

Table 6: Number of students in RSA for 2003

Program	Number
Engineering	130
Information Technology	61
Medicine/Allied	51
Postgraduate	115
Total	357

3.3.4 *Size of the University workforce*

In the faculties of science and agriculture, expatriates occupy the highest ranks whilst the junior positions are reserved for the locals. The information in Table 7 below lacks a breakdown in terms of level of education for the staff profile and the faculties they belong to.

Table 7: Number of staff in NUL for 2002

Category	Number
Academic staff	223
Administrative	89
Technical	131
Secretarial	75
General	224
Total	742

Source: MCST document prepared by DST

3.3.5 *Human and institutional capacity development strategies*

The major challenges that face higher education and S&T system in Lesotho are

- low student enrolment;
- imbalance in science relative to social sciences;
- gender equity;
- poor financing; and
- S&T brain drain.

The S&T policy addresses the issue of brain drain and it stipulates that private businesses be expected to exercise sensitivity in employment and to apply affirmative action wherever possible. Official documents such as working visa and residential permits can also be used as a way of temporarily attracting trained S&T personnel from within the sub-region or abroad. At the same time, Lesotho will be facilitating, training and retaining local S&T personnel.

The policy also addresses gender equity and stipulates that enterprises will be encouraged to pro-actively facilitate women's access and mobility into occupations requiring mathematics, natural sciences, engineering, and technology management.

3.4 *Research funding*

3.4.1 *Government Expenditure on R&D⁵*

It is very difficult to find data on financing of S&T activities in Lesotho. This is because institutional annual budget allocations to carry out their routine work are often referred to as expenses to carry out R&D. Very little if anything is allocated to research from other sectors or ministries with the exception Agricultural Research Department (ARD), NUL, ATS and Central Bank of Lesotho (CBL). Table 8 below highlights some information on R&D expenditure.

⁵ From DST document on Lesotho S&T Indicators, pg 81

Table 8: R&D Expenditure and source of funding by institution

ORGANISATION	TOTAL EXPENSE	EXPENSE BY SECTOR	EXPENSE BY SOURCE
Agric Research 2002-2003	M3 544 482	Government	Government
NUL 2003 2004	M500 000 M20 550	Higher Education	Government
UNFPA	US\$ 1.5mil		From abroad
ATS 2003-2004	M300 000	Government	Government
WFP 2003	M23 400	Private, non profit	From abroad
WHO 2004	US\$ 2mil	Private, non profit	From abroad
LPC 2004	M350 000	Para-statal	Para-statal
CBL 2002-2003	M172 000	Private, non profit	Private, non profit
NHTC 2002-2004	M100 000	Higher Education	Government
LP	Unknown		

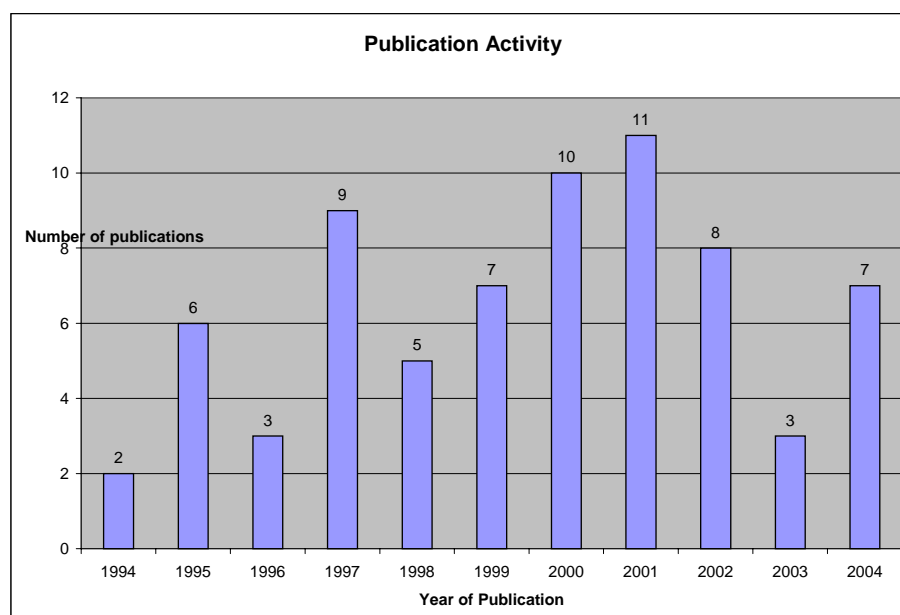
Source: MCST document prepared by DST

3.5 *Research outputs*

3.5.1 *Publications*

The total number of articles published in Lesotho as indexed in the international database ISI between 1994 and 2004 was 71.

Figure 3: Number of publications between 1994 -2004



The only institution that produces scientific publications is the National University of Lesotho.

3.5.1.1 Institutional collaboration in recent years

Most of the collaboration is in the field of health that forms 13% of the total number of publications. The countries involved in collaboration include other African, Asian, European countries and United States of America.

3.6 Concluding remarks

Research and Development in Lesotho need serious attention. These are critical factors in the production of new knowledge, new materials, publications and new services. Knowledge production a form of both basic and applied research has been in existence in Lesotho, but what has been minimal is the coordination and capacity for a research management to transform the knowledge into goods and services. To redress the situation, institutions have been put into place; however, there are some limitations such as poor human resource, infrastructure, as well as financial resources that hinder progress in this path of nurturing the culture of research and enabling a vibrant knowledge-driven society for sustainable development.

To face the challenges mentioned above, Lesotho cannot work in isolation; it needs strategies that enable the country to cope with global changes and developments. This can be achievable through *inter alia* by identification of its national needs, and establishing its niche areas for competitive advantage above all “leap frog” the stages of development, mitigate risks and utilize the technological advancement that have been developed internationally by other nations. This inevitably calls for a strong partnership with the scientific community globally and aggressively strengthens multilateral cooperation in the areas of science and technology.

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