

THE REPUBLIC OF MALI

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Section 1: The political environment¹

The Republic of Mali attained its independence on September 22, 1960. The president, who also is the chief of state and commander in chief of the armed forces, and prime minister who is the head of government hold the executive authority. The National Assembly is the sole legislative arm of the government; currently consisting of 147 members. The judicial consists of the Supreme Court with both judicial and administrative powers. Mali is a multi party democracy. Sixteen political parties are represented in the National Assembly and others are active in local government. Administratively, there are eight regions and capital district.



Section 2: Country characteristics

2.1 Basic economic outlook².

Mali is a developing nation with a fledgling market-based economy that is dominated by subsistence farming and herding. Most (70 percent) of the labour force is engaged in agriculture and fishing. Industrial activity is centred on food processing as well as some textile manufacturing and mining of gold and phosphates. The economy remains vulnerable to price fluctuations in its two main exports - gold and cotton. Most economic activity is focused along the Niger River because more than 65 percent of the country's land area is desert or semi-desert. Economic development has been hampered by the state-led development strategy adopted at independence, which resulted in the proliferation of unwieldy and inefficient para-statals in key economic sectors, as well as the country's deficient economic infrastructure, administrative inefficiency, corruption, and poor social conditions, including a low literacy rate and high population growth rate. Mali remains heavily dependent on foreign aid, but the government appears committed to implementing economic reforms, privatization, and free-market policies in order to meet the expectations of international donors and investors. Economic growth averaged 5 percent in the 1996-2002 period. The International Monetary Fund (IMF) is working with Mali to undertake structural reforms. In June 2004, the IMF approved a new poverty reduction and growth facility (PRGF) arrangement for Mali. The old PRGF expired in August 2003. The PRGF focused on a three-year plan aimed at fiscal consolidation, privatization, and reforms in the cotton sector.

¹ US Department of State, Bureau of African Affairs, April 2006

² <http://lcweb2.loc.gov/frd/cs/profiles/Mali.pdf>

Table 1: Selected economic indicators of Mali

BASIC ECONOMIC DATA	
GDP	\$4.79 billion (2003)
Average annual growth rate (2003–04)	5.4%
Per capita income (2003)	\$250
Annual skilled worker's salary:	\$1560
Average Annual Inflation Rate (2003)	1.3%
GDP composition per sector	Agriculture, livestock, & fishery (36% of GDP); Industry (22% of GDP)

Source: CIA Fact Sheet

2.2 Demographic characteristics

Table 2 summarizes the demographic characteristics of Mali as published in the CIA fact book and presents a picture of a country that has very different climatic conditions, a relatively large population with a high growth rate, high infant mortality rate, low life expectancy and low education attendance & literacy.

Table 2: Summary of geographic and demographic characteristics of Mali

GEOGRAPHY	
Area	land: 1,240,278 sq km
Capital	Bamako; Other Cities : Ségou, Sikasso, Mopti, Gao, Kayes, Timbuktu
Climate	Savannah and desert
PEOPLE	
Nationality	Malian(s)
Population	10.5 million (2002 est.),
Annual growth rate	2.2 %
Ethnic groups	Manding (Bambara or Bamana, Malinke) 52%, Fulani 11%, Saracolé 7%, Mianka 4%, Songhai 7%, Taureng and Maur 5%, other 14%
Religions	Islam 90%, indigenous 6%, Christian 4%
Languages	French (official) and Bambara (spoken by about 80% of the population).
Education	Attendance - 64.3% (primary). Literacy—31%
Health	Infant mortality rate—121/1000. Life expectancy—47 yrs
Workforce	(4 million): Agriculture - 70%, services - 15% industry & commerce - 15%.

Source: CIA Fact Sheet

Section 3: Science and technology system

3.1 Governance of science and technology

3.1.1 *The National Science & Technology policy of Mali*³

During the compilation of this document, the National S & T policy of Mali could not be accessed but a publication (see "Current research in Mali" No. 19, March 2004) made the following comments about the research strategy of Mali:

At the end of the last millennium, in 1999, a national seminar was organized on the National Scientific and Technological Research Policy. However, no decision was taken on the subject of this seminar, because no one at the Ministry for Secondary and Higher Education and Scientific Research really occupied themselves with giving direction to the programme and tabling exact proposals in Parliament.

However, the report on this seminar made important observations:

- The research system is currently characterized by great incoherence arising from the dispersion of the research institutions throughout the technical ministries and the diversity of their legal state (central services, personalized services with financial autonomy, etc.).
- Each ministerial department considers itself solely responsible for the research activities conducted by the institutions relevant to its guardianship.
- The research structures planned and carried out their programmes independently of each other, without referring either to the National Centre of Scientific & Technological Research (CNRST) or the Ministry for Secondary and Higher Education and Scientific Research (MSHESR), i.e. to the official institutions supposed to coordinate and control research activities at national level.
- Research in Mali is 90% externally financed and this constitutes a major handicap in the execution of national research programmes in cases where these do not coincide with the priorities of the fund donors.
- National financing is practically non-existent.

The vision developed by the MSHESR and the institutions is:

- To reassign the MSHESR the role of guardian.
- To recreate a higher council for scientific and technological research.
- To create a national directorate for tertiary education and scientific research
- Redefine the missions of the CNRST.

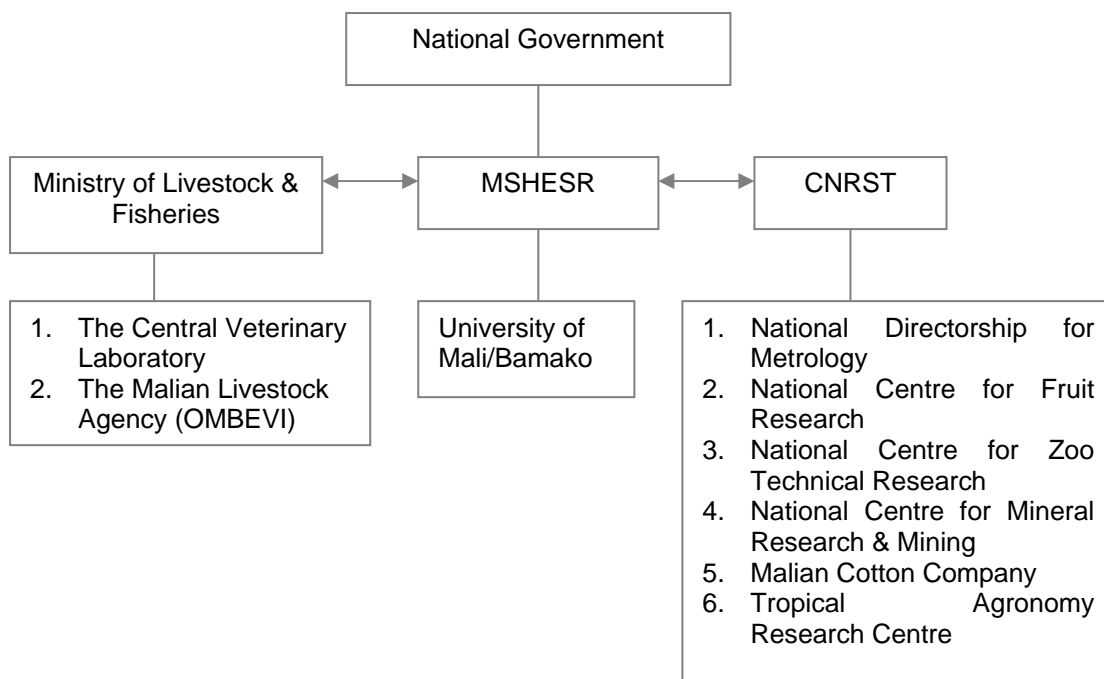
3.1.2 *Institutional arrangements*

Analyses of the document, "Current Research in Mali" No 24, March 2004 and Internet information on S & T in Mali, led to the compilation of the following Mali S & T Institutional Arrangements (Scheme 1):

³

<http://www.mali.ird.fr/actualites/actualites.htm>, Actualites de la recherche au Mali no 19, mars 2004

Scheme 1: Schematic presentation of Mali's S & T institutional arrangement



3.2 Science and technology landscape⁴

3.2.1 R & D performing institutes

Mali has a shortage of trained scientists and technicians and relies heavily on foreign, chiefly French, assistance. A French tropical agronomy research centre is located in Bamako. The National Directorship for Meteorology, also in Bamako, publishes bulletins on agro meteorology and climatology. National centres for fruit and zoo technical research are located in Bamako. A national association for mineral research and mining is located in Kati. The National Centre of Scientific and Technological Research (CNRST) in Bamako, coordinates all research activity in Mali. National schools of engineering and of medicine and pharmacology are also in Bamako. The Rural Polytechnic Institute for Training and Applied Research (IPR/IFRA) of Katibougou, under the University of Mali, provides instruction and conducts research in agronomy, agricultural economics, stockbreeding, forestry, veterinary science. The Higher Institute of Training and Applied Research (ISFRA), under the University of Mali or Bamako, focuses mainly on training and also conducts limited research on biological sciences and human and social sciences.

Mali's principal agricultural research agency is the Rural Economy Institute (IER), accounting for roughly 85% of total agricultural research staff and expenditures in 2001. The institute's mandate is:

- To design, manage, and carry out agricultural research programs
- To plan and evaluate agricultural development projects
- To supervise and coordinate organizations and authorities that conduct research in Mali
- To create, conserve and protect national scientific assets.

The IER oversees six additional regional centres dispersed over the country's various agro-climatological zones, three central laboratories, and one genetic resources unit. A Board of Directors

governs IER whose members include representatives from the Ministry of Agriculture, producer organizations, IER's research, technical support, and finance departments. In 2003, IER's scientific portfolio comprised 16 research programs, distributed over five themes: crops, livestock, forestry and fisheries, production systems and natural resource management, and economics of agricultural networks. IER works closely with the Malian Cotton Company (CMDT), and conducts its applied cotton research on a contractual basis and the two agencies work together on technology transfer to cotton producers.

In 2001, two other government agencies were involved in agricultural R & D and these were the Central Veterinary Laboratory (LCV) & the Malian Livestock Agency (OMBEVI) under the Ministry of Livestock and Fisheries (MEP). The objective of the LCV's Diagnostic and Research Division is to contribute to the prevention and eradication of animal diseases, the protection of public health by the detection of diseases transmissible to humans, and microbiological analysis of food and drink products. The Malian Livestock Agency's mandate is:

- To conduct research on the socioeconomic aspects of livestock production,
- To establish overall development strategies for the livestock sector,
- To enforce quality standards for meat production.

Table 3 presents research institutes in Mali and most, if not all them are associated with the only university in the country, the University of Bamako or Mali (UM/UB).

Table 3: Present Science and Technology infrastructure

NAME OF INSTITUTION	NAME OF INSTITUTION
Educational Institutions:	Centres of R&D and S&T service:
1. University of Mali/Bamako	1. Rural Economy Institute (IER)
2. Rural Polytechnic Institute for Training and Applied Research (IPR/IFRA)	2. Central Veterinary Laboratory (LCV)
3. The Higher Institute of Training and Applied Research (ISFRA)	3. Institute for National Research
	4. Malaria Research & Training Institute
	5. Institute for Research & Development

3.3 *Human capital for science & technology*

3.3.1 *Higher Education⁵*

Higher education flourished in Mali from the 13th to the 16th century but an invasion from Morocco led to the destruction of the University of Timbuktu and its library in 1591. After achieving independence from France in 1960, Mali embarked on a series of educational reforms and from 1962 -1968, the first government of independent Mali embarked on massive schooling campaign at all educational levels. At the tertiary level, specialized schools of higher education were established and these included the National School of Engineering (ENI); the Ecole Normale Supérieure (ENSup), for the training of high school teachers and other professionals; the National School of Administration (ENA); the School of Medicine and pharmacy; and the Rural Polytechnic Institute for Training & Applied Research (IPR/IFRA).

3.3.2 *University of Mali/Bamako (UM/UB): student enrolments⁶*

⁵ International Network for Higher Education in Africa

⁶ International Network for Higher Education in Africa

The university and its constituent institutions have been the only higher educational bodies in Mali since independence, but efforts are now underway to establish a few private higher education institutions.

UM is a public institution endowed with financial autonomy under the supervision of the Ministry of Education. The major academic structures of the university, in charge of the tripartite mission of instruction, research, and service are colleges, schools, and institutes.

Table 4 shows a cross section of the student body by faculty and gender. The various institutes have very low numbers of female students, a common trend in most African universities.

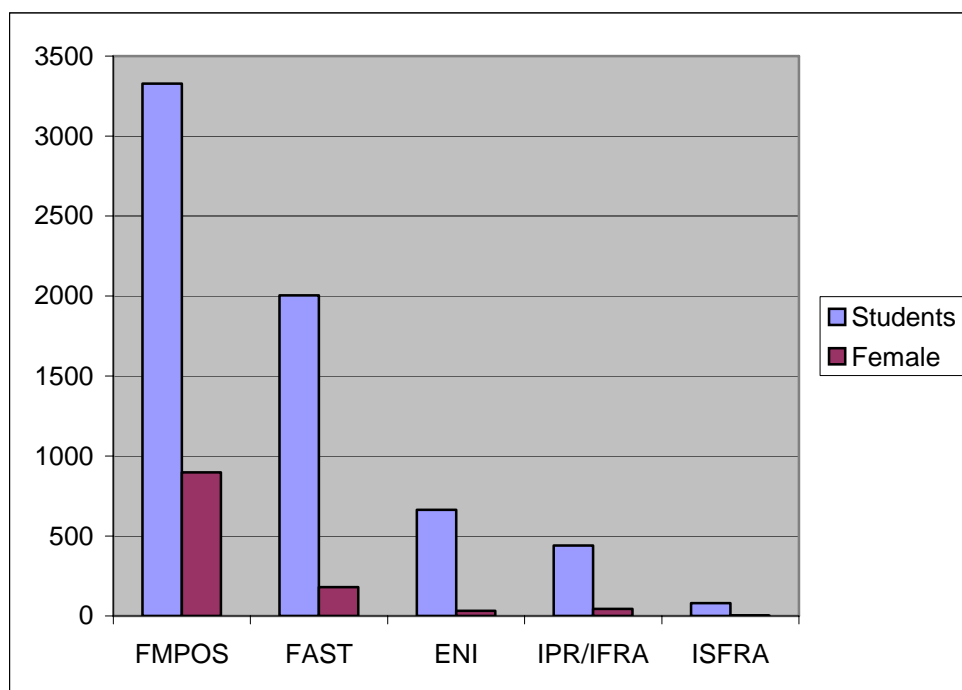
Table 4: Students & faculty figures at UM: 1999-2000

	FMPOS	FAST	ENI	IPR/IFRA	ISFRA
Students	3329	2004	664	440	80
Female	899	180	33	44	3
% Female	27	9	5	10	4
Foreign Students	493	130	130	64	0
Staff	105	51	73	85	13

Source: International Network for Higher Education in Africa

FAST: Faculty of Science & Technology; FMPOS: Faculty of Medicine, Pharmacy & Odontostomatology; ENI: National School of Engineering; IPR/IFRA: Rural Polytechnic Institute for Training & Applied Research; ISFRA: Higher Institute of Training & Applied Research

Fig 2: Students & faculty figures at UM: 1999-2000



Source: International Network for Higher Education in Africa

For the year 2000-2001, the total number of students at universities and other tertiary institutions is presented in Table 5 & Fig 3. The faculty of medicine (FMPOS) attracts quite a number of students followed by the science & technology faculty (FAST). A common trend in all the faculties is the lack of students at postgraduate level, a worrying factor insofar as R & D human capital development. The higher institute for training & applied research has postgraduate students but the numbers are very low considering that they represent the whole country.

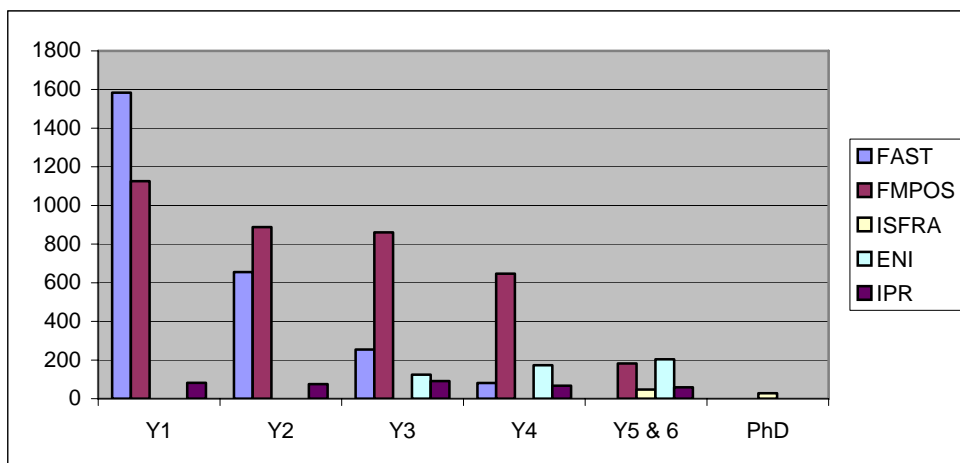
Table 5: The number of students at tertiary institutions, 2000–2001

	FAST	FMPOS	ISFRA	ENI	IPR
Y1	1584	1126			82
Y2	655	888			75
Y3	254	861		124	91
Y4	81	647		173	67
Y5 & 6	0	182	47	204	59
PhD	0	0	28	0	0
Total	2574	3704	75	501	374

Y: Year

Source: Actualites de la recherche au Mali no 19 mars 2004

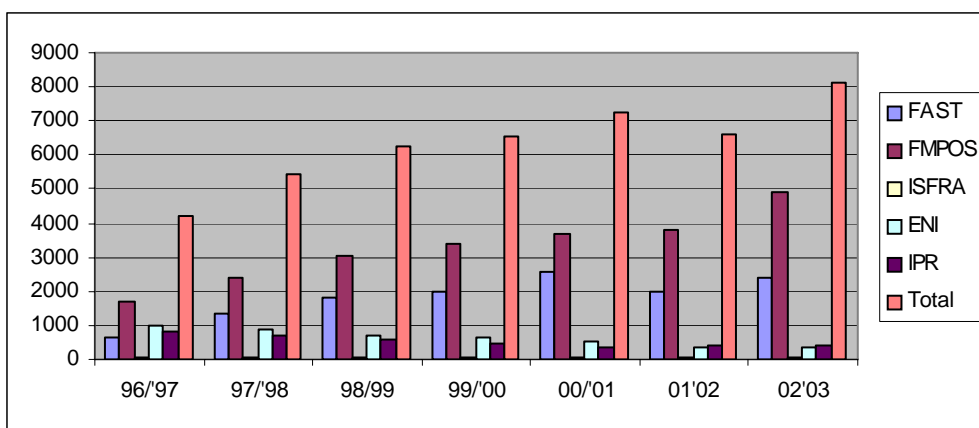
Fig 3: The number of students at tertiary institutions, 2000 – 2001



Source: Actualites de la recherche au Mali no 19 mars 2004

The increase in the number of students in a period of seven years (1996 – 2003) had been considerable (see Fig 4 below). Over a period of five years, between 1996 and 2001, the number of students in the Faculty of Science increased fourfold and the number of students in the Faculty of Medicine doubled. Between 2001 and 2002 there was a slight drop in student numbers, but the increase resumed the following year. Overall, the number of students tripled over a period of 7 years.

Fig 4: The number of students at tertiary institutions, 1996 – 2003



Source: Actualites de la recherche au Mali no 19 mars 2004

3.3.3 Size of Research and Development personnel

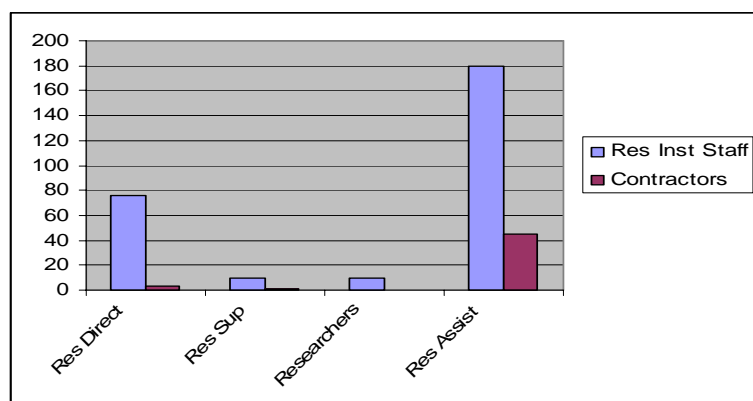
In 2001/2002, a body of researchers who had no teaching obligation existed in Mali and their research positions are presented in Table 6 & Fig 5.

Table 6: R & D personnel of Mali, 2001/2002

Category	Research institution staff	Contractors	Total availability
Research directors	76	3	
Research supervisors	10	1	
Researchers	10		
Research assistants	180	45	70
Total	276	49	70

Source: Actualites de la recherche au Mali no 19 mars 2004

Fig 5: R & D Personnel of Mali, 2001/2002



Source: Actualites de la recherche au Mali no 19 mars 2004

3.4 Research funding

3.4.1 Government expenditure on R&D

Mali's budget or information on Government Expenditure on R&D (GERD) was not available during the preparation of this document; as a result, we could not compare Mali's GERD & its GDP. However, the information presented below is meant to give some indication about Mali's spending trends on R & D.

OMBEVI and the higher-education agencies were almost fully funded by government in 2001. The University of Bamako sets 2 percent of its annual budget for R&D. Therefore, the University of Mali/Bamako disposes of very limited financial resources to accomplish its research mission. Table 7 presents the composition of agricultural research expenditures by government & educational institutions and the government turns out to be the main financier of R&D.

Table 7: Composition of agricultural research expenditures, 2001

Agency	Spending (FCFA millions)	Spending (%)	Agencies (number)
IER	5479.3	86.3	1
Other government	221.5	3.5	2
Higher Education	650.5	10.2	2
Total	6351.3	100	5

Source: ASTI Country Brief No. 17, July 2004

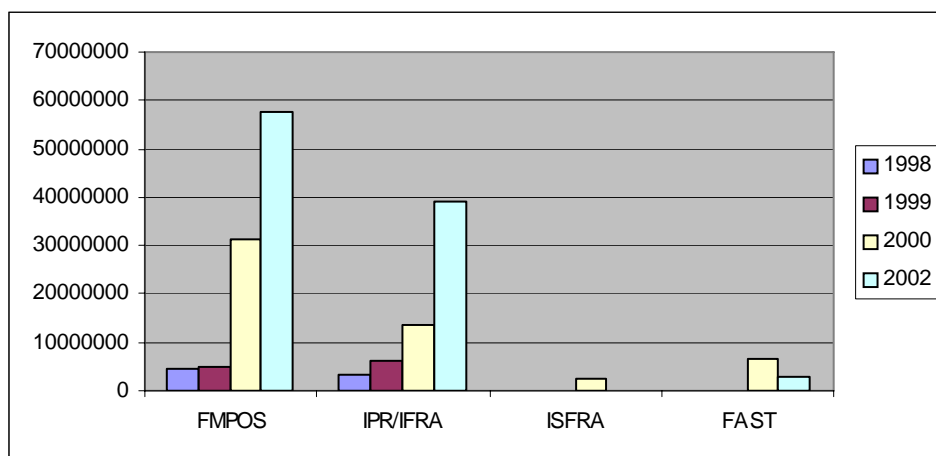
Table 8 and Fig 6 present the breakdown of research credits forming part of the State budget and administrated by the Principal's Office at the University, by establishment (in FCFA) from 1997 to 2002. Most of the budget over the years was spent on the medical faculty (FMPOS). This is understandable, as this faculty is internationally known for its research on malaria. A disappointing figure, however, is the small spending on the science & technology faculty (FAST), a clear indication of the low priority of this sector in Mali.

Table 8: R & D spending at UM (in FCFA), 1997 to 2002

	FMPOS	IPR/IFRA	ISFRA	FAST	Total
1998	4598000	3107500	.....	.....	7705500
1999	5120000	6132000	....	.....	11252000
2000	31491980	13765150	2510500	6432000	54199630
2002	57633170	38988075	.....	2930000	99551245
Total	98843150	61992725	2510500	9362000	

Source: Actualites de la recherche au Mali no 19 mars 2004

Fig 6: R&D spending at UM (FCFA), 1998 to 2002



Source: Actualites de la recherche au Mali no 19 mars 2004

3.4.2 International donor funding

Mali received substantial international donor funding for its R & D in the 1980s from the Dutch government, the United States Agency for International Development (USAID) and Ciba-Geigy. During the 1990s in which Mali's agricultural research agencies showed a heavy reliance on funding from foreign donors, particularly the World Bank, the Netherlands and USAID - total spending stabilized at around \$26 million annually. LCV depended largely on financing from the Food and Agriculture Organization (FAO), USAID, IAEA, the Swiss government and the European Union during 1991 -2001.

Between 1994 and 2001, IER showed heavy reliance on foreign funding. Netherlands, USAID, the Swiss government, CMDT, and the Novartis Foundation provided most of IER's international donor funding in 2001.

Table 9 & Fig 7 present international donor funding in Mali and the list of donors is not exhaustive, but major players are highlighted.

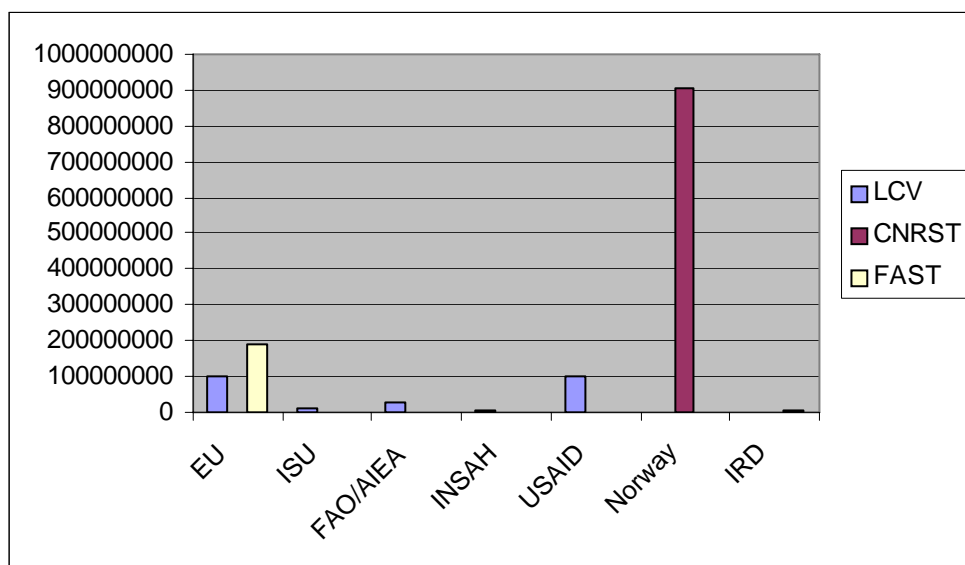
Table 9: International donor funding in Mali (FCFA), 2000 – 2002

	EU	ISU	FAO/IAEA	INSAH	USAID	Norway	IRD
LCV	100000000	9000000	26000000	3000000	99000000		
CNRST						905000000	
FAST	190000000						7000000

Source: Actualites de la recherche au Mali no 19 mars 2004

EU: European Union; ISU: Iowa State University; FAO: Food & Agriculture Organization; IAEA: International Atomic Agency; INSAH: Sahel Institute; IRD: Institute of Research for Development

Fig 12: International donor funding in Mali (FCFA), 2000 – 2002



Source: Actualites de la recherche au Mali no 19 mars 2004

3.4.3 Business Expenditure on R&D

R&D in Mali is largely financed by the national government, loans from the World Bank, and from donors and producer organizations. There is no information available of expenditure on R & D by business.

3.5 Research outputs

3.5.1 Publications

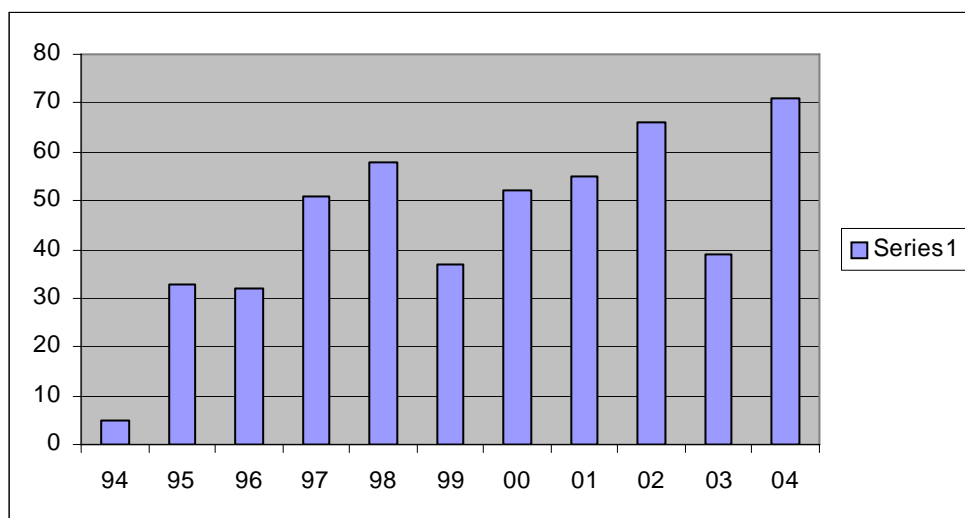
According to the Institute for Scientific Research, Sudan has produced a number of publications (Table 10 & Fig 8) between the years 1994 – 2004, and the low number of publications is clearly indicative of the low level of R & D in Mali as a whole.

Table 10: Scientific Publications -Mali, 1994 – 2004

94	95	96	97	98	99	00	01	02	03	04
5	33	32	51	58	37	52	55	66	39	71

Source: Institute for Scientific Information (ISI)

Fig 8: Publications – Mali, 1994 – 2004



Source: Institute for Scientific Information (ISI)

Table 11 or Fig 9 indicates that a research director produces about one publication every four years if he is at the IER and one publication every two years if he is at the LCV; among all the ranks and institutions, it is the research supervisors at the LCV, followed by those at the IER, who have the largest number of annual publications. Finally, it appears that researchers and research assistants publish practically nothing (this category includes researchers who, in practice, work as engineers, technicians or administrative officers).

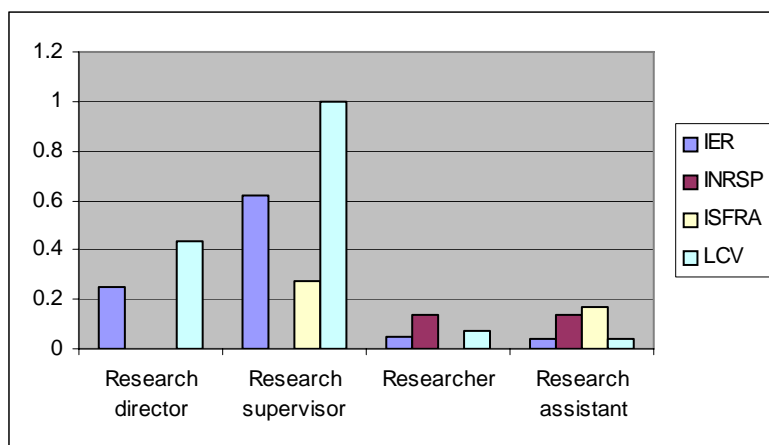
Table 11: Publications by researcher, 2000/2001

	Research director	Research supervisor	Researcher	Research assistant
IER	0.249	0.623	0.049	0.043
INRSP	.....	.....	0.14	0.136
ISFRA	.....	0.277	.....	0.166
LCV	0.432	1	0.07	0.04

Source: Actualizes de la recherché au Mali no 19, mars 2004

IER: Rural Economy Institute; INRSP: National Institute of Research in Public Health; ISFRA: Higher Institute of Training & Applied Research; LCV: Central Veterinary Laboratory

Fig 9: Publications by researcher, 2000/2001



3.5.3 Institutional collaboration in recent years

Analysis of the ISI report (1994 – 2004) indicates that there is a fair amount of collaboration between Mali R & D institutes with their international counterparts (Table 12), and most of them are found in the USA and France. On a regional basis, American & European institutes are the most favoured. African countries seem to have very little influence, an indication that perhaps there is very little R & D in these countries themselves.

Table 12: International collaboration 1994 – 2004

USA	100	Côte d'Ivoire	8	Burkina Faso	17	Ghana	9
Norway	13	Germany	29	Scotland	7	Tanzania	3
France	109	Niger	29	Gabon	5	Japan	3
Denmark	1	India	17	Guinea	7	Switzerland	17
Netherlands	21	Sudan	4	Ethiopia	6	Ethiopia	6
Belgium	22	Cameroon	8	Zimbabwe	3	Canada	7
South Africa	8	Kenya	21	Italy	20	Senegal	20

Source: Institute for Scientific Information (ISI)

Table 13 lists selected Mali institutes that are involved in R & D as cited by ISI. It shows a strong trend towards agriculture research through the IER, followed by health related research, done by the Malaria Research & Training Centre and the Faculty of Medicine both situated in Bamako.

Table 13: Selected research institutes in Mali as cited by ISI

Inst Natl Rech	29	Fac Med Pharm & Odondostomatol	26	Lab Cent Vet	20
Univ Bamako	37	IRD	22	CIRAD	24
Ins Econ Rurale	87	Dept Trad Med	9	Inst Rech Dev	6
Malaria Res & Training Ctr	28	ICRISTAT	30	Inst Ecol Rural	4

Source: Institute for Scientific Information (ISI)

According to ASTI9, IER collaborates with international agencies such as the Sahel Institute (INSAH), Winrock International, the International Institute of Tropical Agriculture (IITA), the World Agroforestry Centre (ICRAF), the West Africa Rice Development Association (WARDA), the Livestock Research Institute (ILRI), the Royal Tropical Institute (KIT) of Netherlands, the Centre for Agricultural Research Cooperation for Development (CIRAD, and the Institute of Research for Development (IRD), both from France. IER is also a member of the West and Central African Sorghum Research Network (ROCARS) and the West and Central African Millet Research Net work (ROCAFREMI).

The scientific partners of LCV and OMBEVI include the International Atomic Energy Agency (IAEA), ILRI, and the International Centre for Research and Development of Live Stock in the Sub humid Zone (CIRDES) and the Virginia Polytechnic Institute. IPR/IFRA works closely with international agencies such as IAEA, ICRAF and the International Crops Research Institute for the Semi-Arid Tropics (ICRISTAT). ISFRA's scientific partners include IRD, ICRISTAT and various French universities.

3.5.4 Patents

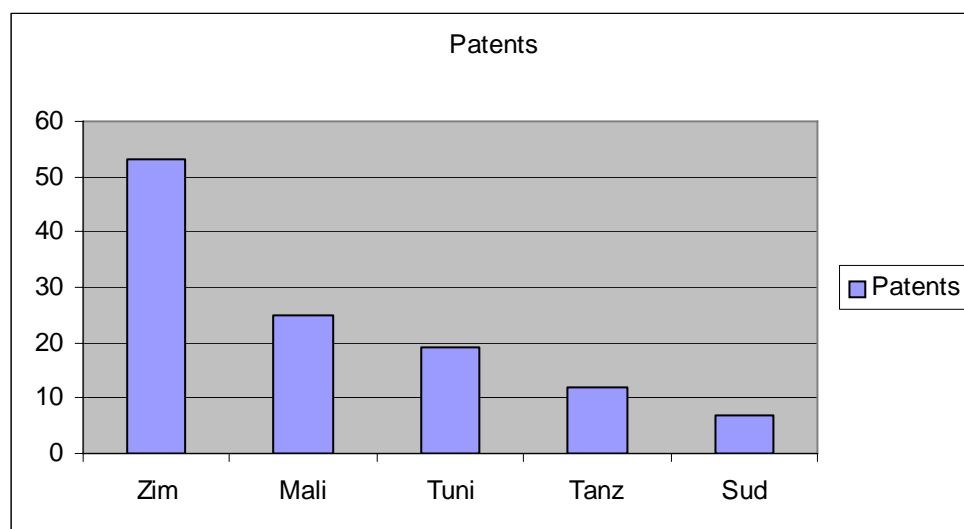
According to USPTO report, Mali produced 25 patents (Table 14 & Fig 10) in about 40 years with no patents at all in the period 1992 – 2005 and even though the patent number is very low it compares well with most African countries. This could perhaps be attributed to its strong international institutional collaboration, especially with France and USA.

Table 14: Patents for selected African countries

Country	Pre 1992	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	All Years
South Africa	2200	97	93	101	123	111	101	115	110	111	120	113	112	100	87	3694
Zimbabwe	42	0	1	3	1	1	0	0	0	0	1	1	1	1	1	53
Mali	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25
Tunisia	14	0	1	0	0	0	1	0	0	0	0	1	0	1	1	19
Tanzania	9	1	0	0	0	0	0	0	0	0	1	0	1	0	0	12
Sudan	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
Libya	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4

Source: USPTO, December 2005

Fig 10: Patents for selected African countries 1963 – 2005



Source: USPTO, December 2005

3.5.5 Recent technological development and emerging technologies

3.5.5.2 Indigenous Knowledge Research

Millet & Sorghum Improvement Initiative (MSII) uses conventional techniques of plant breeding & cultivation methods. In 2004, MSII had 12 PhD scientists, 50 technicians, and assistants; and research facilities like laboratory and equipment. The station has developed new varieties of millet and sorghum. For example, the high yield variety millet (toroniou benkadinniob) produced 1.1 ton/ha, twice as much as high rainfall areas. The new variety is also resistant to diseases such as mildew and pests like striga, and have a shorter growing period.

Mali's malaria research is a field in which the Department of Epidemiology of Parasitic Diseases and its Malaria Research and Training Centre take pride of place, not only in West Africa, but on the whole continent.

3.5.5.3 *Biotechnology*

The Rural Polytechnic Institute for Training and Applied Research (IPR/IFRA) under the University of Bamako forms an important link in Mali's agricultural research structure, having trained the majority of IER's researchers. Besides training, the institute dedicates an increasing part of its activities to agricultural R&D, including crops biotechnology, crop pest and disease control, and soil fertility improvement⁷.

Several Malian Institutions are involved in biotechnical research, these are Central Veterinary Laboratory, the IPRA/IFRA, the biotechnology laboratory of the faculty of Sciences & Technology and the Rural Economics Institute, and the IRD has already contributed towards the training of staff in this field³.

3.5.5.4 *Environment & Energy*

In November 2002, one of the areas of cooperation that were envisaged between Mali and the IRD involved studies regarding the Niger River: the future of this resource, hydro-electrical or hydro-agricultural systems, the optimal utilisation of the water resources and usage (electricity production, irrigation, fishing, fodder, transport, etc.). This subject included an evaluation of projects such as "fishing in the central delta of the Niger" and "integrated administration of resources and their utilisation". It also provided an opportunity for updating information on for example, the field of flora monitoring, herd movements, soil utilisation, etc, and modernising that information using advanced modelling techniques.

3.7 *International co-operation and networks*

3.7.1 *Multilateral co-operations*

Mali has strong relations with bilateral and multilateral donors and is committed to the concept of regional economic integration. Since 1975, Mali has been a member of the Economic Community of West African States (ECOWAS), based in Nigeria, whose objective is to establish a customs union and a common market for West African States. In 1994 Mali joined seven other mainly francophone members of ECOWAS in forming the West African Economic and Monetary Union (Union Économique et Monétaire Ouest-Africaine - UEMOA), whose members have a common currency.

3.8 *Analysis of the S&T system of Mali*

3.8.1 *Comparative Analysis*

The HDI ranking data on Technology: Diffusion & Creation, in addition to the S&T indicators covered in Table 15, also includes elements such as:

- Telephone mainlines
- Cellular Subscribers
- Internet Users
- Researchers in R&D

According to HDR 2006, Mali is ranked 171 and is much lower than Mauritius (HDI rank 63) that is the lowest in the category: medium human development. Mali is categorized as one of the "low human development" countries.

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Table 15: Technology: diffusion & creation indicators for selected African countries

	Mauritius	Tunisia	Algeria	Egypt	RSA	Morocco	Namibia	Botswana	Congo	Sudan	Uganda	Zim	Kenya	Angola	Mali
HDI rank	63	87	102	111	121	123	125	131	140	141	145	151	152	161	171
Patents*	.....	.....	1	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R & D exp**	0.4	0.6	.....	0.2	0.8	0.6	.....	.....	.....	0.3	0.8	.....	.....	.....	.....

Source: Source: Human Development Report 2006

*Per 1 million people, (2004); **Expenditure (%GDP), 2000-2003

3.9 Strengths and weaknesses of the S&T system of Mali

3.9.1 Strengths

- Well-established international & regional R & D collaboration
- Strong emphasis on agricultural R & D
- Highly evaluated Malaria research

3.9.2 Weaknesses

- Mali is one of the poorest countries in the world
- Limited S & T capacity
- Very low spending on higher education R & D

4. References

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