

2.1

A HISTORY OF RESEARCH ORGANISATION

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Scientific activity in any country takes on styles of organisation and overall directions, which depend greatly on the twists, and turns of its history. Our aim here is to trace the history of ‘modern science’ in Morocco, in order to capture the essence of the background to a science policy that is currently emerging.

2.1.1 GENESIS

The western part of North Africa, the Maghreb, has never been the hub of Arabian science. Nevertheless, more than 1 000 years ago the region was tinted with some glory. Some universities founded long ago were science’s finest creations: Kairouan in Tunisia, Tlemcen in Algeria, and the Quaraouiyyine of Fez in Morocco (founded in the mid-ninth century and sometimes considered the oldest university in the world). When the Arab empire declined, scholars were no longer protected and left, driven out by persecution. In the 14th and 15th centuries, scientific invention shifted east and west to feed the Indian and European renaissances. The universities fell into ruin or retreated into a role of purveyors of routine teaching. Endogenous knowledge was scattered and not well codified. It either stagnated, unable to revitalise itself, or died out completely. The only traces of that golden era are some popular, rosy images of the typical ‘scholar’.

The revival of science in North Africa, in its modern form, came with the advance of the European empires in the 19th century. A country’s own governments (as in Egypt and Tunisia) sometimes promoted such regeneration, anxious to harness the powers of medicine and the military sciences of Europeans, who were considered a threat. More often, however, the colonisers, who gained hold of the region in stages (Algeria from 1830, Tunisia in 1896, Egypt in 1879, and Morocco as late as 1912), imported it.

The scientific activity that was established, therefore, was cast in the mould of a specific type of production, attached to human and natural sciences, and directed by the colonising country’s institutions. The remit of local science was, above all, data collection. Subjects of indigenous interest hardly featured in such exercises (Gaillard, Krishna & Waast, 1997: 23-29). This colonial style of scientific production was not monolithic, however; it did leave room for considerable variations. Three countries were colonised by France, but the circumstances by which the coloniser gained its grip were different. The result is a set of quite

distinct styles of scientific structuring, original combinations of institutions and favoured subject areas. Together, they generated models that continue to leave a strong imprint.

When Algeria (occupied early on and destined to receive a substantial influx of colonisers) was annexed completely as a French *département*, the phase of exploration was a long one. It required all types of research (including fundamental science). Establishments were founded in Algeria to that end. A university even saw the light of day in 1905.

For Morocco, the reverse was true. The imperial take-over came late (1912), and the country was not considered 'uncharted' territory. The country's 'development', the pragmatic catchphrase of the day, did not seem to call for either erecting grand institutions or conducting basic research in the eyes of the governors that were dispatched from France. A system of colonial research did exist, but became rapidly oriented towards applied research, utility for colonial policy or for the colonists themselves. It was devoted, above all, to two fields: health and agriculture. The system was essentially based on *research centres* (see Table 1), which were placed under the responsibility of the Protectorate's technical services department. These establishments employed full-time, civil-service researchers from France, where they had received their training.

The Pasteur Institutes of Tangier and, later, Casablanca conducted some fundamental research (especially on rabies, Kleiche, 1994), with the tasks of vaccine production and epidemiological surveillance quickly gaining priority over all their other activities. In agriculture, the colonial administration organised its research services around a 'new' discipline: genetics. The first trial gardens, field trial stations, and experimental farms were soon grouped together within the agricultural experimentation centre, which was assigned the task of cereal selection, notably work on wheat (Kleiche, 2000: 15–16).

Twenty years later, there was a change in approach. In France, during the late 1930s, this change was expressed as a prime concern for the planning and coordination of scientific investigations at the scale of the whole empire. The movement was driven by France's newly-formed Centre National de la Recherche Scientifique (National Centre for Scientific Research (CNRS)). The new organisation and the ethos it embodied promised a broadening of the scope of research to make room for fundamental studies and new disciplines.

World War II put the project on the backburner, but it returned to the fore after the end of the conflict (Bonneuil & Petitjean, 1996: 119–145). In Morocco, a Franco-Moroccan Scientific Committee was established at Rabat. With the French Committee for Scientific Research acting as adviser, its job was to watch over the orientation and organisation of research. If original areas of study were considered necessary, it was the joint committee's task to establish partnerships between Morocco and the appropriate French organisations. However, its impetus was curbed by a colonial administration fixed on the short term, and which (in any case) jealously guarded its authority (BIM, 1947: 26–27, and DIP, 1950: 9–10).

The local scientific committee's structure was first determined by the great fields of applied sciences, but gradually changed shape as academic disciplines came on board. It

became the sounding board for the claims of researchers. They wanted laboratories with the most modern equipment, the means for taking part in regional and international conferences, the setting-up of an organisation for basic research, and the creation of a special fund devoted to scientific research by the Protectorate. This lobby hardly gained any attention from government and the CNRS was unable to do anything about it. Just one 'information session' was held in 1945 to bring together the researchers and administrators of Morocco. The Franco-Moroccan Scientific Committee subsequently had only about five plenary meetings between 1947 and 1955. The wishes of the committee's sections were never put into practice. In 1955, on the eve of independence and in the face of so much bad grace, some of them stopped holding meetings (BEPM, 1955:10–48).

Table 1. Research institutions in Morocco under the Protectorate

Date founded	Name	Location	Field				
			Agri.	Med.	NS	ES	SHS
1914	Cherifian Scientific Institute	Rabat			+		
1914	Trial gardens	Rabat	+				
1914	Hygiene laboratory	Rabat		+			
1914	Pasteur Institute			+			
1915	Trial gardens	Marrakech	+				
1916	Experimental farm	Fes	+				
1919	Centre for Agricultural Experimentation	Rabat	+				
1920	Institute for Higher Moroccan Studies	Rabat					+
1924	Genetics and seed testing station	Rabat	+				
1928	Centre for Law Studies	Rabat, Casablanca					+
1932	Pasteur Institute	Casablanca		+			
1940–1945	Centre for Advanced Scientific Studies	Rabat					+
1945	Institute of Oceanography	Casablanca			+		
1946	Public Laboratory for Research and Testing (LPEE)	Casablanca				+	
1945	Agronomic Research and Agricultural Experimentation Services	Rabat	+				
1946	Marine Fisheries Institute	Casablanca	+				

Key: Agri. = agricultural sciences, Med. = medical sciences, NS = natural sciences, ES = engineering sciences, and SHS = social and human sciences.

The updating of research envisaged by France after World War II went no further than the foundation of a new Institute of Oceanography in 1945 and, in the applied sector, the creation of a Fisheries Institute and a Public Laboratory for Research and Testing in 1946 to serve industry and civil engineering. Local science remained deprived of means, extremely isolated, and either enslaved to the administration or highly dependent on the science of the colonial power. Both the policy of coordination at empire-scale, and the scheme to build up a network devised by proponents of centralised planning in Paris (under the responsibility of the CNRS) failed.

Nevertheless, in terms of accumulated, stored and usable knowledge, the newly independent Morocco was left with a significant legacy. In terms of institutions, however, it was slim. Research centres were fewer, less diverse, and less well endowed than in other Maghreb countries (¹). Only in agriculture it was enough strong in order to form a true system, and this took place under the close eye of the corresponding government department. In this case, the system generated models of research and development and even of rural ‘scientific development’ (Kleiche, 2000: 19). However, in this field as in others (medicine included), practically no Moroccan researcher had been trained to take over; and sometimes not even as assistants.

Colonisation turned out to bring very little for higher education and training (Table 2).

Table 2. Higher education institutions in Morocco at the time of the Protectorate

Date founded	Name	Location	Agri.	NS	SHS
1923	Secular Sciences Institute (Institut des Sciences Profanes)	Fez		+	+
1928	Centre for Law Studies (Centre d’Etudes Juridiques (CEJ))	Rabat, Casablanca			+
1940–1945	Centre for Higher Scientific Studies (Centre d’Etudes Supérieures Scientifiques (CESS))	Rabat			+
1945	School of Agriculture	Meknes	+		
1945	Xavier Bernard School of Agriculture	Rabat	+		
1945	School of Horticulture	Meknes	+		
1945	School of Agriculture	Soueilah (near Marrakech)	+		
1950	Moroccan School of Administration (Ecole Marocaine d’Administration (EMA))	Rabat			+

Key: Agri. = agricultural sciences, NS = natural sciences, and SHS = social and human sciences.

There was a fully operational university in Algeria (albeit largely closed to the local people, referred to at the time as ‘the Muslims’), and the creation of one in Tunisia had been under debate (even though the project fell apart in the end).

¹ Algeria was left with the most substantial scientific legacy, such as in the areas of ‘discovery’ (astronomy, geosciences, and ecology). It was also left with a greater number of ‘modern’ centres (in nuclear studies, haematology and cancer research, etc.). This sector was sustained by French assistance over more than 10 years, then was picked up and occupied differently by the first, young, trained researchers and academics (see Hocine Khelifaoui, *La Recherche Scientifique en Algérie*, in Roland Waast and Jacques Gaillard (dir.), *La Science en Afrique à l’Aube du 21ème siècle*, Paris, France, December 2000).

The Protectorate of Morocco came to initiate higher studies only in 1928 when it created a Centre for Law Studies (Centre d'Etudes Juridiques (CEJ)) to produce qualified law graduates, with establishments at Rabat and Casablanca. In 1940, a Centre for Higher Scientific Studies was being planned. It was not operational until after liberation. In 1945, a School of Agriculture was founded at Meknes, with the objective of training agricultural technicians ⁽²⁾. The beginning of the 1950s saw the establishment of the Moroccan School of Administration (Ecole Marocaine d'Administration (EMA)) in Rabat ⁽³⁾, as well as three secondary-level schools of agriculture that produced 'monitors', whose task was to explain and popularise farming information (Table 2).

These establishments were not intended to train for higher degrees or qualifications, although they could provide preparatory grounding for higher studies to be carried out in France. They mainly trained technical assistants needed for the colony. They were, in any case, effectively close to Moroccans, at least at the beginning. When local people gained wider access to these centres (from 1950 onwards) they aimed largely at humanities, law and non-scientific disciplines because of the associated job prospects. Such dispositions were to have an influence on how higher education turned out after independence (1956).

Morocco had not been devoid of higher education before French power gained hold. It was a Muslim system and colonisation did not suppress it. However, it did remain enclosed in its own methods of recruitment, and was detached from any form of training for employment and from any teaching of 'modern' sciences. Demands by students and initiatives by progressive intellectuals from the higher echelons of Moroccan society brought attempts to bring in courses in mathematics, cosmography, applied astronomy, history and geography (Quaraouiine: Institut des Sciences Profanes (Institute of Secular Sciences), 1923–1933). However, they were short-lived, for lack of suitable teachers and equipment (Paye, 1957: 395). Scientific education seemed, therefore, to offer no career prospects for young Moroccans, who found it better to become interpreters or lawyers in the framework of the Protectorate.

Under the Protectorate, no medical or paramedical teaching institution saw the light of day; it was the same story for engineering and technical training (except in agriculture). The higher education establishments were merely at an embryonic stage and had no great culture of research. Moreover, the training of students in the specialist *écoles* or universities of the colonial country (or in other countries abroad), which provided a positive educational contribution in other countries of the Maghreb, was for Morocco no more than a trickle. At independence, Morocco could barely count on 100 engineers or technical professionals (half of whom were in agriculture), about 20 doctors and 6 pharmacists (Laberge, 1987: 194) ⁽⁴⁾.

² This was mainly reserved for descendants of colonial settlers. Its annual intake was about 30 students, who were trained over a 3-year course.

³ After independence this School became the National School of Public Administration (Ecole Nationale d'Administration Publique (ENAP)).

⁴ According to Paule Laberge, at independence there were just 19 Moroccan nationals who were doctors (out of 587 practitioners) and 6 pharmacists (out of 348) available.

2.1.2 A SHIFT OF BALANCE: THE RISE OF HIGHER EDUCATION AFTER INDEPENDENCE (1956–1986)

When independence came, most colonial technicians left the country. The Moroccan government, therefore, found itself in charge of a range of infrastructures whose functioning was jeopardised by the absence of qualified or managerial-level personnel. All administrative, scientific and technical services were faced with the same problem. It was important, therefore, to organise an effective system of accelerated training that was of a high standard.

The task was first assigned to a rapidly-founded university system. The national government built this up (first at Rabat) from the embryonic higher education structure they inherited, and extended it prodigiously. In a second phase, a specific national system termed ‘Formation des cadres’ (professional and management training) undertook to serve the different professional spheres (business schools and engineering colleges). At the same time, the university system grew even further, with establishments setting up in many Moroccan towns. During this period, the services of the pre-existing research centres and institutes were either maintained (to a large extent by French development aid) or transferred to the university sector, the latter of which was the case for the natural sciences, law and social sciences. Those establishments gradually lost their monopoly in scientific production, as higher education gained strength and became more professional.

2.1.3 THE UNIVERSITY SYSTEM

In the period just after independence, the milestones in the organisation of education in Morocco were the Royal Commission on Reform of June 1957, and the Maâmora Symposium in April 1964⁵. The policy decided upon was embodied in a Charter for Education (April 1966). The question of higher education was approached from the need for ‘Moroccanisation’ at managerial and professional levels, and not from a concern for research. At the time, the Moroccan government, like most states on the African continent, showed little interest in scientific creativity. It did not set up any new infrastructure, but maintained the research establishments in place with the aid of France, which delegated qualified aid workers to run them.

In 1957, the Institut des Hautes Etudes Marocaines (research in humanities and social sciences), the Centre d’Etudes Supérieures Scientifiques (Centre for Higher Scientific Studies) and Centre d’Etudes Juridiques (Centre for Law Studies) were amalgamated into a single Faculty of Letters. As for the Institut Scientifique Chérifien, the establishment concerned with natural sciences research, it was incorporated into the Faculty of Sciences. The two

⁵ The conclusion was that all the various systems had to be *united* under the same structure, and that the programme content should be *converted to Arabic*. The managerial levels were to be *Moroccanised* and education *made universal* (at independence, only 12 % of children aged 7–14 years received schooling). In summary, ‘The objective was to provide education, in Arabic, to as many children as possible, administered by Moroccan teachers, with common nationwide curricula and schooling hours’. These principles especially concerned primary education (see Moatassime, 1978: 22–34).

faculties made up the Mohamed V University ⁽⁶⁾, of which was cast in the mould of French counterparts ⁽⁷⁾. It employed a substantial number of aid workers from France until Moroccan teachers could take over.

2.1.4 THE *GRANDES ÉCOLES*

Adding to the problem of a lack of administrators, there was also a shortage of scientific and technical personnel at managerial level. In 1957, the government, composed largely of people trained in humanities or law, set the organisation of elementary education (along with teacher and administrator training) as its priority. A handful of qualified French engineers, who were called in to take over important technical posts, pressed for the creation of high-level specialist schools (*écoles supérieures*), along the lines they had come to know in France. At first, little notice was taken. However, some of them ⁽⁸⁾ banded together with the aim of alleviating the shortage of people qualified with the scientific *baccalauréat*.

They launched preparatory courses for entry into the engineering and technical *grandes écoles*, which recruited their students from the penultimate secondary school class. Two years later, this preparatory organisation itself became (with Unesco's financial backing) the first of Morocco's high-level engineering schools — the Ecole Mohammedia d'Ingénieurs (EMI) — for mining, industry and public works (Vermeren, 2000: 303).

⁶ A Faculty of Medicine was added in 1962.

⁷ Its degrees and the quality of its courses and teaching are guaranteed by the University of Bordeaux.

⁸ Among the most prominent include Driss Amor (chemical engineer, and Minister for Industry), Mohamed Berrada (telecommunications engineer, and Minister for Posts and Telecommunications), Mohamed Douiri (graduate from the Ecole Polytechnique, engineer, and Minister for Public Works) and Abraham Serfaty (engineer graduate from the Ecole des Mines, and Director of Mines and Geology). Source: Vermeren, and an account by Abraham Serfaty recorded on 15 March 2002 at Mohammedia, Morocco.

In 1966, the Institut Agronomique et Vétérinaire Hassan II (Hassan II National Institute School for Agriculture and Veterinary Studies) was created. Although they did not have a high profile at the time, these *écoles* were to become extremely prestigious. They soon stood out as a model showing the way for higher education policy (see Appendix 1: Development of higher education in Morocco, 1956–2003).

The situation changed during the 1970s. In the humanities and legal fields, the Moroccanisation of managerial echelons was a reality. A true critical mass of nationals in such positions had been reached. In contrast, scientific disciplines suffered the effects of the shortage of qualified technical people, aggravated by Moroccan students' lack of enthusiasm for this kind of training (Table 3). The government had to respond at once to a strong demand for education, which was concentrated in the arts and humanities, and to the needs of the public services and an expanding industrial base, which were calling for different knowledge and skills.

These conditions posed a dilemma. Moreover, the economic and political situation had seriously deteriorated. Morocco was reeling from a fall in the price of phosphates (its main export), and suffered the full shock of the oil crisis. The country soon had to submit to the constraints of Structural Adjustment Plans, imposed by the International Monetary Fund, which limited state expenditure.

Table 3. Breakdown of Moroccan students per educational field — 1960s

	Sciences	Medicine	Engineering	Agriculture	Humanities & Law
1964–1965	12 %	10 %	4 %	1 %	63 %
1969–1970	4 %	11.9 %	2.6 %	2 %	79.5 %

Source: Laberge (1987).

At the same time, the universities had turned into an immense hotbed of unrest. In 1957, the founding of a students' union linked with the opposition made it a favoured forum of expression for those kept away from power (Vermeren, 1996). Education became a very sensitive and highly political issue. At the Oaks Symposium devoted to the topic in 1964, a tendency emerged in favour of a process of Arabisation and Islamisation, which opposed the government's bilingual policy (El Masslout, 1999).

During the Ifrane Symposium on higher education (1970), a kind of 'national front' seized the opportunity to form a coalition, calling on students to boycott national elections. From 1965 to 1972, minister after minister proved powerless to contain the dissent. Repression increased. Between 1973 and 1974, arrests became more and more frequent, and the students' unions were disbanded (Squali & Merrouni, 1981: 143–146).

Faced with this situation, the government opted for a large increase in the number of faculties in the provinces, but allocated meagre resources to them⁹. It devoted most of its efforts to creating new professional and managerial schools (*écoles de cadres*) outside the university sphere. The idea was to get around the drawbacks inherent in universities. Admission to the *grandes écoles* was selective, and students were under much closer supervision (less politicised). They remained centres of education that were expressly bilingual, in the name of scientific communication.

Besides, this system had the approval of the now powerful chiefs in the government's technical departments, many of whom had been educated in that mould and who dreaded the functional inexperience of the universities. They wanted to have their collegial say over the content of the teaching. They also saw the potential for quickly and assuredly getting hold of qualified personnel for middle management functions in their departments, by practising a policy of grants and pre-recruitment within the *écoles*.

From the 1970s onwards, the more specialised sectors (business, various types of engineering, rural, and environmental specialities) began to find their place under the different ministries (except education). Assistance from bilateral or international aid funds was channelled preferentially towards this new means of education and training. The five-year plan for 1973–1977 encouraged private investment and sought to modernise those sectors that could earn foreign currency. It banked on the *grandes écoles* system to produce the managers and professionals necessary for bringing new development, and agricultural and tourism projects to fruition.

⁹ The government order of 16 October 1975 upgraded all the advanced establishments in any given town to the status of universities.

It was for political reasons, therefore, either to separate these establishments from the universities (which had become the centres of unrest) or because of the need to build captive breeding grounds for rare talents, that the government chose the *grande école* blueprint, which had been so little appreciated before. This new sector soon strengthened with the addition of many institutes to tertiary-level schools, avoiding the dual risk of succumbing to mass intake and Arabisation (see Appendix 1).

This is the salient feature of Moroccan higher education: in order to disconnect the sector termed ‘professional and management training’ from the universities, the leaders of that sector had the idea to link up their establishment to supervisory bodies other than the ministry of Education. The dual nature thus built into the higher education system was to come into play between the ‘academic’ and ‘technological’ sectors, as soon as the *grandes écoles* started to develop their own style of science.

2.1.5 ACADEMIC AND TECHNOLOGICAL RESEARCH: SEPARATE DEVELOPMENT

With the research centres, universities and *grandes écoles*, we have presented the main players on the Moroccan research scene, which was to experience a strong upsurge. This was achieved, however, without much support from the state (even though in the 1970s the state began to be persuaded by the idea that scientific progress was the source of development)¹⁰. Growth, however, was more the result of dynamics within professional circles. A distinction must be made between two professions: university teachers and ‘technologists’.

2.1.5.1 University expansion and mass intake (1980–1990): dynamics of the academic world

The main mission of the new universities was teaching. The government gave no stimulus at all to research within them. However, the strong growth in student numbers led also to an increase in teaching staff. The situation was not easy for the new recruits. As soon as they arrived, they had to take on a lot of teaching for an ever-increasing number of students. The burden of teaching left little time for accomplishing ‘personal’ work — and the universities considered research to be just that, as they had not yet developed a research culture. The mass increase was no illusion. Student numbers climbed from 25 000 in 1975 to 50 000 in 1980, 100 000 in 1985 and 200 000 in 1990. The university network in Morocco expanded (Appendix 1) and the universities recruited substantially (Table 4).

¹⁰ A subject area commonly promoted at the time by Unesco.

Table 4. Growth in student numbers and teaching staff in university establishments in Morocco (1955–2000)

Academic years	Number of students	Number of student-researchers
1955–1956	1 687	0
1960–1961	5 117	172
1970–1971	14 808	488
1980–1981	86 844	2 490
1990–1991	206 725	6 437
1998–1999	249 253	9 867
2003–2004	277 428	10 413

Source: Ministry of Higher Education (website: <http://www.dfc.gov.ma/>).

In 1975, the first laws were established that were entirely devoted to university organisation¹¹. They conferred a status on teacher-researchers, and a specific salary scale was introduced that led to a salary increase. The university system matured. It started offering higher degree courses. Some of these teachers began to regard research as part of their vocation. In spite of adverse circumstances (and almost non-existent financing from the institutions), they worked diligently at developing original research. They considered that it was the real job of university academics, which set them apart from their colleagues working at a different level, and that it was the duty of a teacher worthy of the title ‘superior’. They were also undoubtedly spurred by the academic rule, which (in principle, at least) makes career advances dependent on research output.

With full Moroccanisation (during the 1980s) and the arrival on the scene of many young teachers, fresh with research experience from recent doctoral or post-doctoral studies, output became highly visible. Development aid from abroad had an essential role in the observed ‘upsurge in research’. However, because hitherto the government had not expressed any priorities with regard to research, the subjects stemmed largely from the researchers’ personal choices (or rather the opportunities for external funding they succeeded in grasping). Those who did the research wanted their work to have relevance, but the absence of coordination of ‘upstream’ research activities, insufficient ‘downstream’ assessment, and deficiency in government financing encouraged an individualistic approach; at least, that was the case in some disciplines (particularly in the humanities and social sciences).

Researchers could group together only in response to criteria of the moment, and not as a response to building up lasting research entities or laboratories¹², which (in any case) would not have been recognised as formal structures. Furthermore, they did not gather with the intention of pursuing national programmes, which were subject to state policy devised only for immediate or short-term considerations. The research groups which formed generally owed their existence to the personal action of a researcher or professor, sometimes associated with a small team. Their project could not easily be dovetailed with others. They had limited means, and often they survived only thanks to international

¹¹ At the time, the universities were under the wing of the Ministry of Higher Education and Research, created in 1976, whereas the specialised schools of engineering (*écoles d’ingénieurs*) continued to depend on the technical ministries. The establishments were given autonomy over budget and elected advisory councils were envisaged. These instructions were hardly acted upon at all.

¹² There are, of course, exceptions that are more numerous than people report. Interviews conducted with researchers (particularly those who have been productive for a long time) highlight the tenacity of teams who kept up a lengthy project at the university. In contrast, several institutions (Hassan II, Mohammedia, etc.) have built up their reputation on the strategic planning of their research.

aid. This aid was based on friendships that the director may have made with colleagues in a host university in Europe while preparing his/her thesis or with partners in bilateral scientific aid schemes while working on joint projects.

2.1.5.2 Growth of the 'technological' sector

Two types of establishments, which were created outside the university system, contributed to the country's research potential. They were the specialised research centres (active mainly in agriculture and health) and the newly created high-level *grandes écoles*. By the beginning of the 1970s, the research centre world had stagnated. The Pasteur Institute, which had experienced some organisational problems, seemed to be in complete decline in the 1980s (Laberge, 1987). From 1970 onwards, the Institute of Marine Fisheries became more involved in commercial affairs than in scientific activities. The Institut National de Recherche Agronomique (National Agronomic Institute (INRA)), one of the paramount institutes of the colonial era that had fallen into decay and dissolved, was reborn in 1982, but no longer had the mission of planning and coordinating agricultural research. In its revised form, it was a modest executive agency, which performed applied and development research work at the command of its own Division of Agricultural Education, Research and Development.

The research revival came from elsewhere. The Institut Agronomique et Vétérinaire Hassan II (Hassan II National Institute School for Agriculture and Veterinary Studies) demonstrated initiative and built bridges between basic research and action research. Its teachers were recruited from among its own students (the best), and sent for PhD training in the US. There, they benefited from research experience (of the 'research-by-doing' type). The institute also insisted that they continue to devote themselves to research upon their return. It was decentralised, and had branches in nine regions of the country. Original research was conducted, which was soon to make the institute the principal producer of scientific results in agriculture.

In order to achieve this, it adopted an aggressive canvassing strategy to obtain finance. It relied on its ability to propose relevant subjects, and insisted that students were represented in the research project (students, in turn, were obligated to participate in work experience and deliver reports). In the experimental areas, the institute maintained permanent contact with the field, farmers and professionals in agricultural development. These major advantages rendered it worthy of interest to all the international development aid bodies, and those in charge locally. It attracted a substantial influx of money locally. The research it conducted was a mark of the prestige and high standard of the establishment, and (at the same time) a source of funding.

This original model inspired some imitators. Its arrival on the scene heralded the emergence of a new 'technological' field. It was not what would be considered 'academic' (even though the institute that promoted it in Morocco devoted itself to teaching), in the sense that the research performed had no crucial significance for career promotions. It was done on a larger scale than the applied research of the old specialist institutes

because it included work carried out ‘upstream’, and involved (at the same time) a direct link with the development services, which were beginning to be developed in government departments and industry (industrial companies).

Around the 1980s, a major novelty was the introduction of research and development centres within most ministries and some large public companies. Fifteen public or quasi-public research establishments arose mainly in the fields of mining, phosphates, energy and nuclear technology (see Appendix 2). They employed full-time researchers, often on a contract basis (not as civil servants). These centres were often better equipped than the universities, and had better financial resources. However, more was expected of them in terms of immediate, solid application results than from exploratory or education-oriented research.

2.1.6 CONCLUSION

On the one hand, it can be seen that the few elements of inherited colonial infrastructure, once modified, re-appropriated and enhanced, were essentially the bricks with which to build a national, tertiary academic education apparatus. This system, intended for training administrative middle management, left room — thanks to the determination of teachers at the time — for a strong research dynamic to develop at its margins.

On the other hand, the state had backed technological research in public institutes set up for that purpose. Clearly, research as an activity was defined differently in the two cases. The research centre sector mainly conducted work for development, and mostly employed engineers with advanced qualifications and high-level technicians. The university sector did research in an exploratory vein or for educational purposes. Its researchers were largely academically qualified with masters’ degrees and now, above all, doctorates.

As a result, Moroccan research at present is conducted in two distinct styles of science, flourishing in separate institutions (Appendix 2).

Could a new situation bring a convergence of the two styles? What topics of common interest could crop up for researchers? What initiative on the part of the authorities could make it happen (when for a long time neither ‘camp’ was able or willing to make the effort)? This is not a rhetorical question, but one that we are bound to consider, given recent developments. It is a new paradox of research, which has developed spontaneously, and abruptly becomes an object of interest and regulation. Before examining this original episode, we will take stock of the situation.

Appendix 1. Development of higher education in Morocco, 1956–2003

1a. Universities

Date founded	Name	Location	No of students	No of researchers	Field				**No pub. 1997–2001
					Med.	NS	ES	HSS	
1956	Mohamed V University	Rabat	43 721	2 271	+(1962)	+	+(1959)	+	446
1974	Hassan II University	Casa-blanca, and Mohammedia	46 349	1 916	+	+	+(after 1990)	+	317
1975	Sidi Md Ben Abdellah University	Fez	34 788	1 078	+(1998)		+(1995)	+	261
1978	Cadi Ayad University	Marrakech, Safi, Beni-Mellal, and Errachidia	32 684	1 269	+(1998)	+	+(after 1990)	+	620
1978	Mohamed I University	Oujda	19 535	587		+	+(1990)	+	152
1978	Ibn Tofail University	Kenitra	8 707	405		+	+(1990)	+	217
1978	Chouaib Doukali University	El Jadida	8 374	438		+	+(after 1990)	+	226
1978	Moulay Ismaïl University	Meknes	24 879	663		+	+	+	233
1980	Abdelmalek Saadi University	Tétouan, and Tangier	13 133	548+27		+	+(after 1990)	+	114
1980	Ibn Zohr University	Agadir	12 590	455+21			+(after 1990)	+	216
1980	Other Universities	Settat, Errachidia, etc.	4 491	189			+(after 1990)	+	164
Total Number (1999)	11		249 253	9 867					2 966

Key: Med. = medical sciences, NS = natural sciences, ES = engineering sciences, and HSS = human and social sciences.

** Number of articles: total number for the period from 1997 to 2001, except for human and medical sciences.

Source: Rossi & Waast (2002).

1b. Ecoles de formation des cadres (*advanced specialist schools created outside the university system; they belong to the 'sector' termed 'management and professional training'*)

Date founded	Name	Location	No of students in 1998	No of re-searchers in 1998	Field				No pub. 1997–2001
					Agriculture, forestry, etc.	Civil engineering, chemistry, electrical, minerals industry, etc.	Management and professional training (economics, law, architecture)	Specialist in education	
1970	Ecole Nationale Forestière des Ingénieurs (ENFI)	Salé	111	23	+				
1963–1966	Institut Agronomique et Vétérinaire Hassan II (IAV)	Rabat	1 560	328	+				137
1945	Ecole Nationale d'Agriculture de Meknes (ENAM)	Meknes	397	74	+				57
1971	Institut Supérieur de Commerce et d'Administration (ISCAE)	Casablanca	889	56			+		
1971	Institut National des Postes et Télécommunications (INPT)	Rabat	131	46			+		32
1971	Ecole Hassania des Travaux Publics (EHTP)	Casablanca	294	71		+			26
1972	Ecole Nationale de l'Industrie Minérale (ENIM)	Rabat	258	83		+			14
1986	Ecole Supérieure d'Electricité et de Mécanique (ENSEM)	Casablanca	347	69		+			12
1996	Ecole Supérieur Industries Textiles et d'Habillement (ESITH)	Rabat	115	26		+			
1967	Institut National de Statistiques et d'économie Appliquée (INSEA)	Rabat	159	50			+		12
1978	Institut Supérieur d'Etudes Maritimes (ISEM)	Rabat	128	20		+			
1980	Ecole Nationale d'Architecture (ENA)	Rabat	395	13		+			

Date founded	Name	Location	No of students in 1998	No of re-searchers in 1998	Field			No pub. 1997–2001
					Agriculture, forestry, etc.	Civil engineering, chemistry, electrical, minerals industry, etc.	Management and professional training (economics, law, architecture)	
1978	Ecoles Normales Supérieures (8)	Casablanca, Rabat, Fez, Marrakech, Meknes, and Tétouan	1 106	943			+	103
1974	Ecole Supérieure des Sciences de l'Information (ESI)	Rabat	348	20			+	
1950	Ecole Nationale d'Administration (ENA, ex ENAP)	Rabat	48	41			+	
	Others		1 337	542			+	135
Total	40 specialist schools belonging to the Formation des Cadres		7 623	2 405				528

* Figures for 1998.

** Figures for 1997–2001.

Appendix 2. Research institutes in Morocco

Date founded	Name	Location	No of researchers	Field			No pub. 1997–2001
				Agriculture, forestry, etc.	Civil engineering, chemistry, electrical, minerals industry, etc.	Medical research	
1914	Institut National d'Hygiène (INH)	Rabat				+	12
1914, 1932	Institut Pasteur (IP)	Casablanca, Tangier	136			+	25
1982	Institut National de Recherche Agronomique (INRA-Maroc)	Rabat	135	+			56
1945	Institut National de Recherche Halieutique (INRH)	Casablanca		+			16
1946	Laboratoire Public d'Essais (LPEE)	Casablanca	435		+		32

Date founded	Name	Location	No of researchers	Field			No pub. 1997–2001
				Agriculture, forestry, etc.	Civil engineering, chemistry, electrical, minerals industry, etc.	Medical research	
1985	Centre National d'Etude Spatiale, de Télédétection et d'Energie Nucléaire (CNESTEN)	Rabat			+		8
	Centre de Recherche et d'Etude Démographiques (CERED)	Rabat	90				
1990s	Centre de Développement et d'Energie Renouvelables (CDER)	Rabat	90		+		5
1990s	Centre National de Recherche Forestière (CNRF)	Rabat	21	+			3
1990s	Dir. des mines et de la géologie Bureau de Recherche et de Prospection Minière (BRPM)	Rabat	17		+		9
	Centre National des Etudes Routières (CNER)	Rabat	17		+		6
1975	Groupe OCP (CERPHOS)	Casablanca, Marrakech	817		+		9
1976, 1981, 2000	Centre National pour la Recherche Scientifique et Technique (CNRST)	Rabat			+		12
1990s	Office National des Eaux Potables (ONEP)		220		+		6
1990s	Office National de Recherche et d'Exploitation Pétrolière (ONAREP)				+		15
TOTAL			2 500*				227**

* Figures for 1998.

** Figures for the period from 1997 to 2001.