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Abstract:

It is clear that the development of research is based on a stable environment conducive to the emergence of scientific thought. Institutional stability, the presence of resources and coordination of research activities are clearly at stake in a policy-level research for a move towards full-blown search for development.

The study of this issue is the focus of our work; it is the analysis of **indicators** in the evaluation of the **national innovation system** through the **governance** of public research in Senegal. Introducing the concept of governance is justified by the fact that for us, the debate on research and development can be relevant only in relation to policy choices and goals assigned to research.

1. Introduction and issues

When we asked, can research serve to the continent reconstruction after independence, many specialists responded in the affirmative way (Ki-Zerbo, 1992). Others felt more confident looking as an essential point of sustainable development for Africa (RUELLAN, 1988).

Nearly six decades later, this issue remains a burning issue. If the relationship between scientific research and reconstruction of Africa, at that time seemed so obvious, their practice for development of the continent still raises many and different questions.

When many researchers, analyzing the "underdevelopment" in Africa, reminiscent of the economic, historical (and ASSOGBA Monga: 2004), governance (Mbaya AMINE: 2000) and even cultural (Kabou: 1991), Jacques Gaillard him, calls and says other factors:

"Africa has approximately 13% of the world's population but has only one per cent of global wealth. Thus, an estimated 50% of the African population lives in a state of poverty, that 40% suffer from hunger and malnutrition and more than half have no access to drinking water. Many political, economic and environmental can be advanced to explain the impoverished state of Africa: the colonial legacy followed by decades of authoritarian regimes, a chronic lack of transparency in economic transactions, often accompanied with corruption, non-sustainable use of natural resources; marginal participation in the global economy. However, there is another factor which at first may seem less spectacular than the previous but contributing to the difficulties of the continent to fully participate in global economic development, protect the environment and to develop national strategies for sustainable economic development. This last factor is the weakness of African science and technology capacity in an environment often not conducive to their development. "(Gaillard: 2002)

Such a joint development with the scientific and technical capacity makes two problems in the Senegalese context. One is related to the organization of research and development. Research and development needs to find a purpose and a goal that would link the various stakeholders of the fate of development. Today, many researchers are struggling to do research and come despite many difficulties to produce knowledge, these productions are and remain in the desk drawers secret laboratories. At the same time, in all African countries, programs and projects were held. They are most often based on knowledge or experience of countries elsewhere. On this point, Allan RUELLAN informs us that:

"Some politicians thought they could rely on stock picks too brief and too fast on the results of research done in other lands. By dint of being too eager, they lost much time they wasted a lot of money, they have led many people to dead ends. "(RUELLEAN: 1988)

The other is related to the promotion of such knowledge and raises the issue of implementation of the products of scientific research (and innovation outputs of R & D) so they are serving the people and serve the improvement of living conditions.

"The industrial revolutions, economic, social and technological change that Europe has successively experienced over its history and currently based all its grandeur, are inseparable from his scientific capacity built from its human resources and the interest that it grants to science. The U.S. and Japan which are outside the European continent and are now one of the most developed countries in the world, have in common with the countries of Europe, this firm belief in the virtues of knowledge and science and the strong and permanent collective will to take full advantage of the opportunities they offer. And emerging Asia or North Africa who are on the road to development, are also characterized by the increasing interest they attach to education, higher education and research. "(Niang: 2005, 78)

The debate over research and development and social change in Africa can be relevant only in relation to national political choices and goals assigned to research. By not doing the research base and pillar of policy choices, policy makers in Africa have from the beginning reduces the scope of their efforts and their energy dispersed in vain.

These problems (discussed at two levels) are needed in a challenge that Africans face in conducting research and development of an effective understanding of African societies and positive transformation of these. African countries will struggle to get to grips with these challenges will persist as this research piecemeal, fragmented or most of the studies done in laboratories are sponsored by Northern institutions. Major projects and issues that drive research in Africa, and even in the universities, almost always come from outside. The print is larger than the more familiar Western Africa that Africans or at least, they know better what to do with Africa in research that Africans themselves. In this connection J. Ki-Zerbo highlighted:

"... The fact that 85% of research on Africa takes place outside of Africa shows that this continent is cut off from himself and his gray matter." (KI-Zerbo: 1992)

It is indeed surprising that the problems of research and development still seem valid, while researchers are gaining more and more notoriety and gained more consideration from policy makers, laboratories and research centers are born every day and their products more attractive to the public's curiosity.

Science has traditionally dedicated to the service of man. The analysis of the history of science shows that there is no process of development of a science, which is an ideal type of organization, which the other sciences should be shaped. The diversity of development modalities, practice, and maturation of science through time and space proves that science is a discipline that has never been isolated from the society in which it operates and has always been marked by the workplace culture. Hence the synergy that must always exist between science and culture. There is no science that is essentially Western, American or African. The appropriation of science by a given society necessarily involves its social utility that requires an overhaul methodological and epistemological readjustment to better adaptation and integration into society (Principles - Procedures - Results).

"The fundamental difference between developed and underdeveloped countries is more research into the quality of their brain activity in the state of research and the final destination which is reserved for products of this research, in that economic considerations social and, ultimately, are but manifestations of the use of more or less ingenious than the company has made these results to build the foundations for its welfare. "(Niang: 2005, 78)

In Senegal, a result of repeated failures of structural adjustment programs (1980-1992)[1], the role of scientific research in the development process of a proposed development is increasingly well received by the authorities the country. Thus, there is the integration of new opportunities arising from past experiences and concern for innovation policy, coordination, management and administration of scientific research for Change conditions of populations. In this connection it is noted that:

"No single factor more powerfully affects the course of development of a country that the quality of its governance. When it is open, accountable and effective - when public policies are conducive to innovation and fairness in a dynamic economy - the development is more likely to serve the interests of the inhabitants of the country. Inform governance is

1 New Agricultural Policy (NAP) in 1984, Stabilisation Programme Short Term (SCTP) 1979-1980 Economic Recovery Programme and Finance in 1980-1985, Adjustment Program in Long and Medium Term in 1985-1992

synonymous with this urgent purpose of development research discover, assemble and communicate the knowledge needed for development that is sustainable and democratic. "(Maureen O'Neil foreword CARDEN: 2009)

The finding has emerged that knowledge, rather than the couple working capital, has become the growth engine of the global economy and that its control was a crucial factor of competitiveness. International organizations (NEPAD, OECD, UNESCO) moving more and more support for the development in R & D and exploitation of knowledge. Similarly, our leaders now consider the R & D and innovation as a priority area and are about to refine their mode of intervention in this area.

The renewed interest of development partners for R & D and innovation opens interesting perspectives, given the vital role that they could play in the transformation of national and regional economies and their subsequent contribution to the advancement of continent.

"New studies on the influence of research and evaluation have to begin to understand new aspects. Under certain conditions, policy makers seem predisposed to take seriously the research results. "(Preface Warol H. WEISS CARDEN: 2009)

However, research and development and innovation system in Senegal shows a seamy face most often characterized by an obvious lack of financial resources, inadequate infrastructure, a research too fragmented, not directly related to national political choices, and a innovation system ineffective. The tremendous challenges of research and development and innovation face incentives to take steps towards a better understanding of the workings of the national research and innovation in Senegal.

Despite an important potential contribution to economic and social development of African countries, research and development is confined to a marginal role and suffers from many deficiencies, particularly in terms of steering, organization and effective management. The lack of strategic policy research and innovation, the lack of financial resources, research equipment, dialogue with potential users of research results, development of appropriate research results, etc. are all factors inhibiting research and development in Senegal.

"To improve the lives of some, especially the poor, the development research will almost always influence policies to influence the development. "(Maureen O'Neil foreword CARDENS: 2009)

The depth of the problems of research and development and innovation and the lack of precise information in this sense pushes us to question the public research in Senegal and to introduce the term "governance".

The implementation of any policy requires, first, to have reliable information to be able to do later, a critical analysis. Responding to this principle, the development research in developing countries is based on research, which corresponds to the effective realities. So then the measure of innovation is to succeed in a mastery of research and its indicators that determine it. The purpose of this study is to achieve first a first inventory of the national system of public research in Senegal, its governance, its organization and financing methods before measuring the potential for innovation. Accordingly, this first objective is in a process culminating knowledge of national science policy.

This interactive process required the involvement of many stakeholders at different levels of responsibility and activity, including:

• Policy-makers;

• Heads of institutions of higher education and research and all research personnel;

• The heads of funding agencies;

• Representatives of the scientific community, including associations of scientists.

We tried to meet with representatives of each of these levels / sectors in our study. However, due to the hectic schedule of these meetings these people were not easy to organize. Nevertheless, and despite the difficulties associated with this problem, the vast majority of managers have been met.

The institutions visited

Presidency of the Republic

National Agency of Scientific Research (ARESA)

Ministries

Ministry of Scientific Research (MRS)

Ministry of Health, Prevention and Public Hygiene (MSPHP)

Department of Mines, Industry and Small and Medium Enterprises (MMITPME)

Public institutions of higher education

Cheikh Anta Diop University of Dakar (UCAD)

University Gaston Berger of Saint-Louis (UGB)

University of Thies

University of Bambey

National research institutes

Senegalese Institute of Agricultural Research (ISRA)

Institute of Food Technology (ITA)

Senegalese Agency for Technological Innovation (ASIT)

Regional institutions

African Regional Centre for Technology (ARCT)

Cooperation Institute of Development Research (IRD)

Centre for Development Research Centre (IDRC)

Regional Office for West and Central Africa (WARO)

Other

National Academy of Science and Technology of Senegal (ANSTS)

National Centre for Scientific and Technical Documentation (CNDST)

2. History of the practice of research in Senegal

The history of science in Senegal shows a development of scientific institutions in two main areas: health and agriculture.

The creation of the first research institutes

In 1921, the Experimental Station of the peanut is created Bambey, in 1924, the Institut Pasteur in Dakar, is implanted in 1930, and a geological survey in 1935, the Central Laboratory rearing was born and 1936, created the French Institute of Black Africa - IFAN (shifted to the biology, ecology and social sciences). The creation of IFAN responds to a movement in the early 30s, seen around the Colonial Exhibition at Vincennes, a renewed interest around the colonial question. It appears to intellectuals and politicians of the metropolis that the study of countries and people they administer, and they "support the education and protection" is a duty and a matter of "honor colonial".[2]

The implementation of these scientific research institutions in the early 20th century was promoted by the presence of the Committee of historical and scientific studies of the AOF established in 1915 by Governor General Clozel whose role was to coordinate efforts research and publication on West Africa, to ensure continuity and to make the results available. The newsletter published by this committee, initially entitled "Directory of memories" (early 1918) and "Bulletin of scientific and historical studies of the AOF," published regularly, helps to improve the dissemination of scientific studies produced on the Federation of West Africa. It was not until 1937 during a scientific conference organized in Paris that one expresses the need to give the colonies a research organization to "put science to work the colonies (Gleize, 1985: 7) The major research institutions and higher education in Senegal today are the inheritors of these institutions.[3]

In 1943 is created the ORSC (Colonial Office of Scientific Research), which subsequently became the ORSTOM (Office of Scientific and Technical Research Overseas), now Institute of Development Research (IRD). Because of its central role in the AOF, Senegal and Ivory

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2 Gaillard J. et R. Waast. 2000, L'aide à la recherche en Afrique subsaharienne : comment sortir de la dépendance ? le cas du Sénégal et de la Tanzanie. Autrepart, 13, pp 71-89

3 It should be noted that in the eyes of the colonial power, the development of sciences and engineering sciences, in the colonies, are not a priority.

Coast were the first two countries to host ORSTOM centers (1949 in Senegal). At first devoted to the study of soils, the Centre of Dakar will open to other disciplines since 1960.

The University of Dakar and its role in the national research system

Founded in 1918, the School of Medicine of Dakar is the first draft of higher education in countries of West Africa. In 1949 she opened her teaching Physics, Chemistry and Biology (PCB), creating a certificate of pre-medical studies. The early 50s saw the opening of colleges attached to the University of Bordeaux as part of the Institut of high studies of Dakar, which is the first step towards the official founding of the University of Dakar, which takes place February 24, 1957.

This is just before the country's independence (1960), the University of Dakar was born, the 18th French university attached to Bordeaux and Paris. It changed its name in 1987 to become University Cheikh Anta Diop (UCAD). Located 5km from the historic center, is now fully integrated into the urban area.

Apart IFAN, most institutes of higher education or research were created in the 60s. For ten years the university is dedicated to teaching duties without great ambition research. The teaching was like so much to that lavished in France and, indeed, the student population was mostly French (rates ranging between 61 and 74%) until 1967. However, in 1969, the courses are deeply transformed, with the aim, "Africanization" which aims to adapt to national needs and development needs. Concomitantly, the number of students increases dramatically, from 1,012 in 1959/60 to 12,000 in early 1980 (with a peak growth during the 70s when their number increased from 2 500 to 10 000 in ten years. Today, the university is more than saturated with a total number of students bordering the 55,000 which far exceeds its carrying capacity.

The institutionalization of agricultural research and agribusiness in Senegal

In the institutional landscape of science Senegalese agriculture is a very special place because it is (with health) to one of two priority areas supported by the colonizers in 1920.[4]

Upon independence, the country inherited the structures established by the city. Structures which, France continues to operate and manage. However, such management to adapt to local needs, new structures are created: IRAT (Institute for Agronomic Research and tropical food crops) and CEEMAT (Centre for Studies and Experimentation of tropical agricultural machinery) in 1960. This is a time when the number of researchers is growing and we restructured the existing research activities in the field. Thus, for example, that the Federal Centre of Agricultural Bambey, created in 1921 turned into a national center is then put under the tutelage of the IRAT and that research on cotton are assigned to the IRTC (Institute of Cotton Research and textile fibers).

In 1961, thanks to the technical and financial support of ORSTOM, the ORC is created (Oceanographic Research Centre of Dakar-Thiaroye). In 1963, creation of the ITA (Institute of Food Technology, in 1965, creating the NWRC (National Centre for Forestry Research).

Not until the "great" when DGRST is very active in structuring science and scientific professions that are created for the Senegalese Institute of Agricultural Research (ISRA) in 1974. This consolidates and restructures, by major subject areas, the host of institutes specialized in products which, in close support of French institutes counterparts, fell within this field.

The proportion of Senegalese researchers at all institutions will now grow significantly and steadily. By 1977, half the teachers at the University of Dakar are national (a little medicine and a little less science). They represent 80% of the workforce in 1985 and 90% in 1988. It is the same in research institutes, such as ISRA) which, through intensive recruitment (one hundred researchers in ten years), the proportion of Senegalese researchers from 13% in 1974 to 55% in in 1980.

From the year 1980, a steering research by donors?

[4] Creation of the IHRO (Research Institute for the oils and oilseeds) in 1942; CTFT (Centre Technique Forestier Tropical) in 1948; IEMVT (Institute of Animal Husbandry and Veterinary Medicine in tropical countries) in 1948; The ORSTOM (Office of Scientific Research Office of colonial becoming the scientific and Technical Research overseas) in 1949

The development of science and technology during the 70s had led to a change in funding this sector. The new dimensions of the scientific effort required of the State unprecedented, but also external support larger scale. During this decade, official development assistance believed would dramatically (doubling from 1970 to 1985). This was part of the logic of the Vienna Conference on Science and Technology for Development (UNESCO, 1979) where the international community had taken a position on the fact that research contributes to development and that therefore anchor it in the least the least developed. FAO and USAID, the World Bank and finally brought therefore a significant reinforcement to aid French (still active) and a multiple of smaller donors followed suit not to strengthen research in Senegal.

Paradoxically, this influx of support will soon shatter the cohesion of the device Senegalese. Faced with donors who want to "measure" the effects of their action, the schools become competitors and seek to assert their comparative advantages. In the opposition between the different types of research (pure and applied, etc..), Respond quarrels training (university or school): simple "academic" cons "engineers", they inhabit a large number of research centers which ISRA. In 1979, the General Delegation for Scientific Research turns and gradually loses its importance and we are witnessing a restructuring of research institutes seeking to be more visible and more attractive vis-à-vis their donors . Thus, for example, that ISRA becomes in 1985 a "scientific establishment of an industrial and commercial." most other research institutes are following suit as they become dependent on their ministries.

With the dismantling of DGRST, science is no longer set to "block" some o f its branches are dependent on professional bodies backed by funders that they have captured. National choices become, in fact, partially dependent on funders (World Bank, USAI, WHO). In college, medical sciences are those which, at first, doing the best play their game, their environment is more structured (hospital, scholarly associations, conferences and journals) invites them to continue teaching, research and medical practice.

But the statute of academic exchange. They get a status of a teacher-researcher: career complete opening of pay scales, teaching loads limited. Their careers are managed by committees of scientists interstate coordinated by the African and Malagasy Council for Higher Education (CAM) which takes into account the number of papers published in journals approved for advancement. Research is becoming a major concern to the University and it becomes potentially rival the great institutions that hitherto monopolized support for science.

The ODA, which for fifteen years had been growing and generous, decreases from the 1990s. Besides development assistance, through large contracts of cooperation with public institutions, we turn to the market, companies. The research agendas themselves are changing: research must now respond to the concerns of environmental protection, control. Population, the fight against major pandemics. International aid is moving increasingly toward such programs. Besides the major donors who are still there but looking to diversify their partners and want to distance themselves from their "clients" too "supported" emerges a new variety of funders: bilateral cooperation, foundations, NGOs. These donors become new, crescent, the most important "Sponsors" of work study and expertise opening, in fact, an important market research, market in which rushes academics hitherto little affected by the funding international cooperation.

3. Main Indicators of Development Research

Since independence, Senegal has prepared an assessment tool through the establishment of a computerized management of scientific and technical potential with databases on human resources, projects and research programs and financial resources. This system has been for several years, the dashboard of the National Research powered by descriptive analyzes of the data that informed the decisions of government. With the instability of the governing body, this system could not be preserved and capitalized.

In 2006, a workshop organized by the Ministry of Scientific Research, in partnership with the Institute of Statistics of UNESCO, has helped revive the investigation of indicators of science, technology and innovation. Thus the results obtained and published by the Institute for Statistics (UIS) report, in 2005, researchers in 2349 individuals (excluding doctoral students) listed in the public and private structures of Senegal.

In 2008, Senegal, with eighteen other African countries, participated in the African Initiative on Indicators of Science, Technology and Innovation (ASTII), launched by AMCOST and executed by the office of NEPAD Science and Technology. The measurement of research and development (R & D) and innovation is the main objective of this initiative that will enable Africa to have, in the short term, data and reliable statistics internationally comparable and long-term an observatory on indicators of science, technology and innovation. The results of this pilot phase were published in the journal 'African Innovation Outlook' and the main results for Senegal are described below.

- Human resources dedicated to R & D

Density researchers

The results of the 2009 survey, researchers give 7859 individuals distributed in the various sectors of performance (higher education, state, private companies and non-profit institutions). It appears from these results that Senegal has, in 2008, 661 researchers per million inhabitants and occupies after South Africa in second place among the nineteen African countries participating in the pilot survey on indicators of science, technology and innovation. The goal is to reach Senegal's 1441 researchers per million inhabitants in 2020, following the recommendations of the OIC. Is a gap of 780 researchers to fill in relation to demographic change?

Participation of women in R & D

Women's participation remains very low in the R & D in Senegal, compared with the rate of some African countries such as South Africa and Tanzania (more than 40%). There are 1890 women researchers representing 24% of research staff. Much work remains to be done in terms of science and technology policy taking into account the gender aspect, especially a parity law has been passed and adopted by Parliament.

Distribution of researchers by sector of performance

Most researchers are employed by the public sector (97.5%), nearly 96.4% in higher education and 2.1% in national research institutes. This is certainly a force in the generation of knowledge, but the virtual absence of scientific and technological activities in firms is not conducive to the enhancement of knowledge and know-how from these laboratories. It therefore becomes necessary to implement a strategy of incentives and creation of technology-based firms.

Qualifications of researchers

The qualification is an important indicator for measuring the level of education of researchers and research quality. It should be noted that Senegal has 2,003 researchers with doctorate and is behind South Africa and Nigeria in absolute Nigeria ahead but when you consider the relative values. This result is not surprising because Senegal has always been recognized as a

country producing quality human resources, and his whole policy is based on its human capital with 40% of its budget on education.

Distribution of researchers by field of science and technology

The science and technology is an important indicator that the qualification because it allows for better control and guide national strategies for research with a good representation of the researchers. Senegal has more social scientists in relative value. However, it should be noted that there are more scientists called hard with a total of 4,012 researchers on 7859: medical and health sciences with the highest rate while the agricultural sector is poorly represented. This poor representation is the agricultural sector due to the high number of PhD researchers enrolled in universities and representing two thirds of the research staff. Therefore, it will, among other actions, to create doctoral programs with specializations in this area, especially as Senegal, with its various agricultural projects and programs (REVA GOANA, etc..) Should further develop the human capital that is allocated to agricultural research to ensure sustainable food self-sufficiency.

Researchers by age category

The personnel involved in research activities is still very young, because the majority are in the age group 25 to 34 years. PhD students have certainly contributed to this high rate and this should not obscure the aging of research staff research structures of the state sector.

Researchers by nationality

Senegal has 1452 non-Senegalese African researchers on the 7859 or a rate of 18.5%. This result shows once again that Senegal is a hospitable country and plays an important role in regional and continental integration.

- The expenses allocated to research

Funding for research and technological innovation remains a major challenge. In Senegal, the implementation of research depends on both the government grant and external funding, some of which are obtained by research teams in international calls. The private sector contributes very little to the financing of public research. The key instruments of direct public funding of research are mainly:

• Impulse Fund for Scientific Research and Technology (FIRST), the Publication Fund, the programmed TGs (GTP) administered by the Ministry of Higher Education and Scientific Research;

• Fund the National Agricultural Research and Agri-Food (FNRAA) of the Ministry of Agriculture;

• Funds from abroad.

Higher education receives a grant, but more than 85% of this allocation is earmarked for salaries. To this we must add support for study tours and research laboratories and doctoral students who are all Fellows. In the salaries of faculty members, administrative staff and technical service tasks assigned to research, both between the funding of research activity, taking their time on research (FTE).

Intensity of R & D

One of the most widely used indicators in the measurement of R & D is the ratio of spending on R & D relative to GDP. This indicator measures the intensity of research is a key factor in economic growth of a country, and that is why the African Union, in one resolution, recommended to all African states to devote minimum of 1% of GDP on R & D. Senegal, with about 0.37% of GDP spent on R & D, has a lot of effort to do this. However, this ratio does not include direct funding received by some university laboratories as part of international cooperation. The data estimated by the Ministry of Economy and Finance have reported 0.5% of GDP and remain below the recommendation of the AU.

Expenditures by sector of employment

The distribution of R & D again shows the important contribution of the public sector with a total of nearly 74%. However, we find that spending on R & D in laboratories and national research institutes, namely the state are very close to those of higher education while in terms of density, the latter sector with 96.4% of researchers is the backbone of the research system. This is mainly due to the fact that these state structures receive much money from abroad.

Expenditure by source of funding

The results show that the state is the primary funder of research, with nearly 57.4%, with a small contribution (0.3%) of capital from universities. The results also show that research in Senegal depends heavily abroad which contributes 38.3%, excluding funding of university laboratories obtained in the framework of international cooperation and that have been taken into account. For better steering research, Senegal needs not only to stay but still the largest contributor to see the business sector participate in the funding for better orientation of research activities that meet the needs of people.

Scientific output

In Senegal, research has produced significant results and in many areas. However these results are mostly unknown to the general public and even policy makers as being returned in the form of scientific output accessible to a limited audience or in the form of products or small-scale prototypes. There are more scientific publications and very few patents and prototypes.

Valorisation of research results

Extension and enhancement of research results are important tools in the national research and technological innovation.

In terms of agriculture and food technology, research and development has contributed to the transfer of modern farming methods, to raise yields and promote the exploitation and processing of local products.

Indeed, the ITA has funded various results in the processing and preservation of local food such as hibiscus, mango, nététou, coffee touba .... which gained market share in regional and international level. Thus, research development at the ITA has helped train and supervise various economic interest groups made up mostly of women (drinks, couscous, tiakri, cottage cheese, sour milk, bread, coffee Touba, ...) . Also, in collaboration with Oxfam-GB, ITA undertook the marketing of local products of high quality through the Panal (Standardized Africans and Accessible Products) that will be installed around the country (three in the city Dakar). Consequently, these different designs have won the prize "cereal Awards" awarded by the French company Danone in 2006 and the price of the Islamic Development Bank (IDB) Science and Technology in 2007.

The Senegalese Institute of Agricultural Research (ISRA) is also shown in the area of agricultural research by the selection of high yielding varieties and production of pre-basic seed corn, peanut (Flower 11), cowpea, millet, sesame and rice adapted to low rainfall and short cycle and more than 300 tomato varieties, including tomatoes Xina allowing the spreading of production to the winter period).

In the context of technological innovation, plowing devices and post-harvest technologies, shelter-dryer for the conservation of onion have been developed. The ISRA is also known in eleven countries in the sub region for the production and sale of 25 types of vaccines vaccine against zoonosis. Forestry ISRA has selected tree species tolerant to salinity, acid sulphate soils adapted to allow the recovery and promotion of agro-forestry salty soils.

In order to ensure better dissemination and valorisation of research results, essential step in recognizing the role of research in response to demands for economic and social development, it is envisaged the establishment of national recovery . This structure will serve as a bridge between the research community and users of research and mission will be to promote and make visible the achievements of science and technology research. Within this structure, the Centers for Research and Testing (CRE) that have been launched since 2004 and the extension program is under way, play a role in the development and popularization of science and technology. This will install the CRE of Pout, which will focus on the sector of food, and CRE Mbour focused on aquaculture and fish processing.

The national innovation system

Senegal, like most African countries, has a national innovation system including the interaction between different actors is still very low. Research-Development, recognized, as a key input contributing significantly to innovation, is mainly conducted in universities and research institutes attached to ministries. The private sector, ie companies and industries, has very rarely within them services or R & D departments. Lack of R & D activities in companies, and the type of research that is conducted in most research organizations favored the weak relationship between universities and industry.

It is with this observation; in 1996 Senegal has started the project of developing a technology park, the image of science and technology parks located around the world. The technology park would foster innovation and strengthen the ties that should exist between the sectors of

research and industry. Thus, 196 hectares have been dedicated to the science park site where the telecommunications operator Sonatel was the first company to settle there. The site was to house within it an incubator in food industry, research institutes to enable the transfer of knowledge to enterprises established. Unfortunately, it was not a successful experience, even if the operator is still there and that the site is still in operation with new directions. Several reasons may explain this failure, which include a few: Senegal does not have at that time a critical mass of researchers and engineers in particular, or technology-based financial structures, but also knowledge and transferable technologies to this pole. The Technopole, became Cyber Village since 2004[5], is managed by the Ministry of Economy, Finance and the Agency for the State Information Technology, with the same objectives of promoting innovation but in the field of technology Information and Communication Technology (ICT).

In 2005, Senegal and Ghana were selected by the United Nations to develop science and technology parks. This project, started in 2007, capacity building, by organizing workshops and exchanges of shares on the concept of science park with all partners (government, private sector, local authorities, etc..) Allowed lead in 2009 to develop a roadmap. The project is currently housed at the Agency for Applied Scientific Research (ARESA) is currently in its implementation phase and looking for financial partners.

4. Conclusion

After this descriptive analysis and critique of scientific research in Africa and Senegal and its evolution since the 1960s, it appeared from the documents that the orientations of research policy have remained constant since the country attained independence. This government commitment, the same determination, to channel and focus research efforts on priority areas of economic development is a major feature of science policy in Senegal.

This guidance does not persist beyond the stage unfortunately the principles and rhetoric, and is clearly at odds, particularly at the institutional level, with the realities of the decade was marked by instability, institutional incoherence and marginalization of research in almost all structures.

The institutional instability that has punctuated the decade 1990-2000 the life of the Organization Director for Science Policy and Technology reflects a total lack of perspective

5 ACT No. 2004-10 of February 6, 2004 establishing a Cyber Village

and prospective dimensions, resulting in a lack of internal coherence in the activities of sparsely and disordered structures in research, resulting in the marginalization of scientific research. As said Abdoulaye Niang, political instability, economic insecurity and social poses a serious threat to the existence and development of research. Indeed, science, to hatch, needs a situation of peace and good physical working conditions and research and a strong motivation on the side of those who practice. (Niang: 2005)

Policy research, more than any other, must be part of the time and all the parameters (finance, human resources, national priorities). In this respect a ODPST swallowed the rank of First Division, then tossed a department to another, can not be the guarantor of this condition, and therefore can not ensure the strengthening and sustainability of research structures and reliability of university research.

Transhumance structures (DAST, CNDST, ISRA) and attaching them to function with other ministries' immediate concerns, "eventually create discomfort at first, then a break resulting from a lack of" leadership "in this sector, the structure with such a function having no moral authority, and resources and the institutional mission to perform his classic definition, pulse, development, coordination and monitoring of policy Research.

Instead, we have established a steering preference for activities related to the execution of research projects, which have absolutely nothing to do with the core mission and a substantial ODPST.

Coordination is not an academic discipline, much less an exact science. It must be based on texts, bodies, mechanisms; procedures that the administration and implementation help ensure the best management system. However, the situation that prevailed, led organizationally, profound lethargy, if not a very advanced obsolescence of texts, bodies and mechanisms.

Another major feature of what we call, for ease of reference, national research policy, is the inconsistency, beyond the inadequacy of the national effort to develop research.

Over 75% external funding supports national research. Although some resources from both loans as it is partly the case for agricultural research, the fact is severe enough, and sufficiently indicative of the position of the research in the scale of national priorities.

The national budget in the overall effort is allocated almost exclusively to the management of salaries, allowances and research grants. This means that the items as important as infrastructure, equipment and even the current operation, are charged against the funds of foreign origin, therefore subject to fluctuations in political cooperation partners.

Beyond that insufficient effort, which some would willingly and only on the state of finances, another fact worth noting: it is the steady decline in resources allocated to research during these periods included mentioned. Excluding the "parenthesis ten" 1973 - 1983, the national budget devoted to research, has steadily decreased in constant francs until after the alternation. Just take the last example before alternating with lower budget MRST (2%) while the national budget has grown more than 3%.

Inadequate resources and lack of effort can be seen, beyond the management of structural adjustment policies, as an illustration of the marginal position occupied by research in the political will of governments.

Senegalese research, after more than fifty years of independence, continues to seek a personality, to establish an identity. It has therefore come for research in Senegal when it must play its role in society by integrating its production function of knowledge for its environment. The outgoing state that characterizes since independence, it must pass the state citizens through research and scientific output useful for social and economic development. And in fact become a "Search and inventive citizen."

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