Knowledge Awareness and Standards in Agricultural Research in Algeria: Prerequisites for a National Information System of High Added Value †

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ABSTRACT: This paper gives a review of a survey in 2008 on Algerian scientists specialized in agronomic, veterinary and biological sciences, in order to analyze their information behavior and beliefs to evaluate the importance of shared knowledge standards and values. Algeria strongly suffers from insufficient agricultural production and needs to fit into this logic and to use its search results as source of innovation and performance in its current strategy of reducing its food expenditures. However, one of its limitations consists in the lack of tools to foster the capitalization and enhancement of its scientific output. The answer is to propose an information model that considers all connections between actors involved in research as well as those in development. The collected data reveal an essential need for the creation of a convenient framework for the evaluation and sharing of knowledge as a collective good. It is aimed at the creation of an information system with high added value (National Observatory of the Agronomic Research), including a uniform thesaurus in the field specific to the agronomy for the national device of research.

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1.0 Introduction

Scientific knowledge production plays a fundamental role in our societies. Therefore, the definition of programs and research topics must be translated into socio-economic program policy by governmental and corporate priorities as the needs of a country. The whole aim of research programs, as specified by the report of the expert board on science and technology, emphasizes that (Rapport du conseil 2001, 8):

> For a society to progress and be supportive, with a competitive economy, it is necessary to encourage innovation and creativity at all levels. The society should reflect country priorities, strategies and objectives clearly defined in research programs.

Thus, research becomes a multidimensional activity and must simultaneously contribute to the production of certified knowledge, public goods, professional skills, and also contribute to the construction of techno-economic knowledge networks, linking the world of research with that of economy so as to create a homogeneous space which encourages the established relationships. In the third millennium, the changes in the economy and the world society require new requests regarding highly qualified human resources. The scientific research must be assured by competences and human resources quality. On the basis of this report, the human factor becomes the essential component in the competition regarding research activity.

For this reason, we present some key figures which are analyzed by the observatory of sciences and technologies. In 2006, the census in the world concerning the investigated population reveals more than 4,200,000 researchers and engineers of research and development (in full-time equivalent). The United States, with more than one million scientists in their laboratories, represents a very broad potential of competencies. The European Union counts more than 900,000 (a little less than the United States, but 250,000 more than Japan). These data are all very significant for the importance of science insofar as they show how far the development of a country is related with the importance of its pool of scientific competencies.

The level of development of the companies is thus unquestionably related to the level of the investments which they can devote to research. But, not only because the control of the ICT also continues to be a crucial factor of development of the capacities of research. However, for the social networks, the speed of circulation of the scientific information and techniques all over the world generated a remarkable phenomenon of universalization of knowledge as specifically the revolution of new ICT. This synergy between science and technology information gave in its turn birth to international networks of co-operation, sharing common strategies of research thanks to the division of knowledge.

Under this view, UNESCO has the role to contribute with the maintenance, advance and with the diffusion of the knowledge. It encourages the cooperation between nations in the field of exchange of publications and other supports of information, and it facilitates, by appropriate methods of international cooperation access of all the people to this scientific reserve. Thus, any research project performed in collaboration is built on a shared advantage which is based on the fact that each participant has something to contribute to this collaboration.

To perform scientific work, the researchers need an institutional framework, as well as known means and places of production and diffusion to them for the division of knowledge (university, institution of research, research laboratory, etc.). This can be implemented only by the solid presence of the national systems of research which are characterized by the functioning of strategic analysis, political orientation, coordination and management of knowledge. Thanks to this institutional organization the maps of scientific relations of networks can be built.

As conclusion, we can say that the success of research is based on the planning of research projects which require exchange between the scientific system and the system of innovation for all the sectors on the one hand and the mobility of qualified human resources, as well as the international cooperation on the other hand.

In Algeria, the outcome of agricultural research, in which we are especially interested in the context of this study here, must be transferred to innovation, initiating new processes for agricultural enterprises. In so far, scientific research knowledge can improve and increase production and become the support for the country development. Nevertheless a strong intellectual resource in Algeria exists. But, the developed skills that allow a contribution to the development by their scientific outcome are they accessible and potentially exploitable? Algeria is facing a challenge by creating an information system of production and dissemination of knowledge on agricultural

research. That is what we propose as findings of this extensive survey which we conducted among more than 300 researchers at the national level.

Actually, decision-makers, scientists and development actors in Algeria do not have satisfactory resources of information and scientific knowledge to assist decision-making, in defining research programs and in evaluating scientific production. According to (Anseur 2002), 75% of Algerian researchers specialized in agronomy agree on the lack of mechanisms for research results transfer and 86% believe that the national scientific production is not accessible because of the lack of tools of scientific production.

Alone, scientific research is not able to ensure sustainable development. It must be accompanied by information systems which are capable of acquiring and disseminating knowledge. To take part in development logic, scientific research has to become a "shared social good," and researchers need to develop tools for visibility and analysis of their cognitive activities.

Algeria has significant intellectual infrastructure (universities, schools, institutions, researchers, lecturers and university students), but how to set this intellectual capital in action as recommended by development experts? Ermine summarized it as follows (2003, 15):

> With classic productionist words: invest in production tools or optimize the organization of labor but nevertheless added by the slogan to increase the skills of your employees. Considerable productivity gains, particularly in the design activities are now expected through better management of collective knowledge capital of enterprise.

The management and transfer of knowledge is essential to ensure persistency and innovation of organizations. "We enter the era of information and knowledge" (Pansard 2000, 15), after the agricultural era and that of the industrial one. Similarily (Ohly and Meichsner 2009, 183) stress that "Information is knowledge which is available at the right time and the right place for problem solving" by quoting Kuhlen (1995) and Wersig (1973).

Considering then the importance of knowledge exchange on the national level, it should be proposed to rethink the set of themes of the collective intelligence and the organization of knowledge. Then the user, may he or she be researcher, decision maker, or with any other current interest, applies knowledge to transform it into another scientific product for the innovation. In this context, (Balmisse 2002, 26) reveals that "the production capacity of the modern societies does not rest solely any more on their factories or their equipment, but more and more on their intellectual capital." He adds to this statement that "yesterday, the money was the most important resource, today it is necessary to add knowledge to it." In addition, the added-value of a production is directly related to the value of the knowledge.

This approach is more or less the framework of this study presented here. It assumes that our intellectual capital serves to the innovation as support for the development. This implies an information system that has a common language for research exchange what means not least the application of a documentation language, e.g., a specific thesaurus in the sector of agronomy. This means control of indexing and vocabulary (Smiraglia 2011, Soergel 1974). The literature relating to the thesaurus concept of knowledge control offers a multitude of definitions. According to Melgar Estrada (2011, 52), "thesauri have been considered among the most expressive systems in this sense, because they permit the user to specify five different types of relations (i.e., BT, NT, RT, USE, UF), while a synonym ring, for instance, only allows the user to express USE and UF relationships." Also, (Lopez-Huertas 2008) presented an extensive theoretical study on knowledge organization in a topic entitled "Some Current Research Questions in the Field of Knowledge Organization," e.g., the inclusion of user terminology into the thesaurus vocabulary could offer more varied conceptual relations among terms.

On the other hand knowledge work has as important aims also the conservation, the transmission and the development of knowledge. This has been confirmed by (Balmisse 2002, 26) by saying it is "a true process of valorization of knowledge implying all the actors of the organization, in total with an aim of facilitating decision making. This process breaks down into various stages of creation, enrichment, capitalization, validation and dissemination of information." This means the implementation of management processes and technological tools are making it possible to acquire, preserve, diffuse and share knowledge finally ending in innovations for a sustainable economic development of a country.

It is important that the scientists in the field of the agronomic research adopt the principle of the intellectual capital like an element of progress and work in favor of a world division of the richnesses which take the knowledge for the agricultural improvement of a country and this not at least by the management of the research tasks and the division of knowledge. An-

swering to these questions requires the proposal of a model of an information system which is designed to establish all these links between actors involved in research and development. This platform must also integrate a uniform and controlled language in the specific field of agronomy using it for different schedules, key sets of themes, and expressions in research. This question concerning the establishment of mechanisms for knowledge exchange on agricultural research in Algeria, in order to integrate it as a source of development, raises now a lot of other issues that must be dealt with to meet this goal before any deeper consideration about an information system model.

The main question that arises is: What are the relevant indicators to be produced for the evaluation of scientific production by the future information system? The objective of this study is to get a visibility of the scientific production of Algerian researchers to determine the kind of scientific and technical production of Algerian researchers, and their preferred kind of partnership in research projects for innovative development. As far as the evaluation is concerned, it should allow us to analyze the level of awareness of researchers on methods and criteria for evaluating scientific research. On which criteria do the researchers rely to identify a known journal as high quality? What are their indicator perceptions to measure science and to assess the scientific production? And finally, how can they observe the socio-economic impacts of the research in general?

2.0 Methodology and population

We conducted a national survey that had attracted the participation of over 300 researchers in Algeria, to know their degree of knowledge on different criteria and evaluation methods. The organization of our investigation consisted of two main phases: at first, an exploratory phase was developed to conduct qualitative interviews, followed by a pre-survey and, at second, another phase that has been devoted to the questionnaire survey. An administrative mail was also sent to reference research institutions to allow the completion of this survey by the researchers. The exploratory phase is divided into two stages: the exploratory interview and the pre-survey. The return on these two approaches revealed that the qualitative survey and pretest were very effective with respect to understanding the mechanisms of opinion formation and the behaviour of the scientific community in this study.

Therefore, it is important to note that starting our study by a qualitative survey allowed us to understand the mechanisms of thought and behavior of the investigated scientific community. A total of 500 questionnaires was distributed. The data collection lasted five months (February-June 2008). We received 395 returns of which 345 were filled correctly: a rate of 69% of valid questionnaires. The concept of scientists includes a variety of status and functions; our target population was in charge of ensuring research and/or teaching activities. As such are concerned the researchers, the teacher-researchers and the research engineers.

In this study researchers and teacher-researchers consisted mainly of part-time lecturers (19%) or in charge of research (14%); the remainder being divided between university lecturers (10%), assistant professors (8%), senior research workers (6%), appendage of research (9%), and of the ones in charge of research (3%). A small proportion of them were professors (5%), chiefs of laboratories (5%) and heads of departments (4%).

It should be noted that cases of high level people in charge, such as research director, director, vice senior and vice-chancellor were nearly not represented with respective rates of 2%, 1%, 1%, 0.4% (one institution was directed by one of these and a person in charge). These figures reveal the under-representation of researchers of "high level;" according to the data published by the Ministry for Algerian Higher Education and the scientific research for the year 2007 they should be about: professors 11%, university lecturers 19%, part-time lecturers 39%, and professor assistants 21%.

3.0 Characteristics of knowledge production in Algeria

3.1 Scientific and technical production

This component is important to have an idea of the scientific production of Algerian researchers and the future information system, whereas a detailed analysis of the information resources and search styles was given already in Bernaoui et al. (2010). The answers reflected the kind of scientific and technical production of Algerian researchers and the type of partnership they focus on in innovative research projects for sustainable development.

Scientific production is remarkable; the majority (95%) of respondents has an intellectual productivity. These data are very satisfactory in terms of interactivity in science. However, we are asking us how far such knowledge and skills are sufficiently accessible and visible such that they can be capitalized and valued.

In addition, we find by this study that researchers give more attention to current research information, such as papers (international conferences, seminars, symposia, etc.), thesis, reports and publication of journal articles than to books (see Table 1).

Type of production	Abs. freq. of responses	Percent
Journal articles	215	25%
Books	41	5%
Report	117	14%
Papers	256	30%
Thesis	231	27%
Total	860	100%

Table 1. Type of Algerian scientists' production

In fact, the main reasons for the dominance for these types of scientific outcome are obvious, since they are strongly linked to the careers of researchers.

In general, the performance of the researchers is measured. In so far, it is necessary for Algerian researchers and also academics to publish their results in national and international journals which have a noteworthy impact factor and to exchange them by scientific meetings which is increasingly required to advance their scientific careers; 70% of scientists with PhD claimed to publish in journals with remarkable impact factor. In contrast, academic books were rather absent in the production of scientists. They might prefer papers or articles to books because these last require much more time and resources for their publications.

3.1.1 Language of Algerian scientific publications

The dominant language of publication was French with a proportion of 68% against a minority of 28% in English and with an unimportant percentage rate of 4% for Arabic language. These results are explained by the fact that higher education was with no exception in French, whereas in English it would have been an inadequate level of qualification. This is shown in Table 2.

Language of scientific publications	Abs. freq. of responses	Percent
French	320	68%
English	131	28%
Arabic	18	4%
Total	469	100%

Table 2. Distribution of the scientific publications by language

This dominance of production in French language is responsible for a major problem: the difficulty for scientists to publish in Anglo-Saxon journals, called "prestigious." These results raise the issue of integration of Algerian scientists into major global topics and in an international context that requires further progress and new developments for innovation. This confirms the inability of the Algerian scientists (or even Algerian research teams) to fit as easily in networks of international exchange, which now use the English language as a way to perform and/or publish debates and scientific co-operations on a high level.

Regarding the crossing of two variables "publications in journals with high impact factor" and "production language," we note that only 40% of Algerian scientists have published in journals with high impact factor in English language. Given these results, we note a serious problem which concerns a linguistic barrier which inhibits the Algerian scientists to become opened to a world without borders, to fit into social networks of scientists and into innovative research projects in promising areas.

3.1.2 Perception of Algerian researchers for journals with impact factor

At the center of this knowledge production and innovation, scientific journals are used as an indispensable vehicle for the dissemination of innovative research. The evaluation depends on the scientific contribution of important outcome, such as publications in reviewed journals or with referee panels and talks in referred conferences or seminars. Let us recall that the access to the body of the professors is determined by publications in scientific magazines with high impact factor. This generally implies to work on innovating subjects and to publish in prestigious reviews. It is for this reason that we raised the following question: Are the articles of the Algerian scientists published in international reviews with a factor of impact?

Now to the question "has the researcher published in journals with impact factor?" This highlights the problem of production language which greatly reduces the chances for submissions of papers in journals with high impact factor published by learned societies or academies. Compared to this observation, our results reveal that 54% of researchers were unable to publish in these journals. Those who had the privilege of accession represent only 37%. Henceforth, it will become necessary to publish in major Anglo-American journals for the recognition of the research

and for obtaining permission to a PhD thesis or a habilitation research, and even to get an application as academic professor.

3.2 Research projects of Algerian researchers

In addition to the scientific output of Algerian researchers which we have analyzed, in addition to their work on research projects, many are engaged in international cooperation and work in institutions of higher education and research units. The analysis of these projects has enabled us to understand the structure of national and international collaborations and with which partners the most cooperative and privileged agreement is possible. These data reveal the high rate of 88% of researchers and academics engaged in research projects. Indeed, the bivariate analysis of two variables which concerns the relationship between types of research projects and scientists' qualification shows that 90% of researchers integrated into institutional projects had a PhD, 40% with a Master degree or "Magister" were engaged in their PhD projects, and few of them were coming at the same time from institutional projects (NRP, CNEPRU).

The strong participation of researchers in national competitive bidding driven by the NRP and CNEPRU, expresses the commitment of the scientific community in support of socio-economic concerns of the country. Under this alternative aspect, 42% of research projects are conducted in an official university context (National Committee for Appraisal and Planning for University Research CNEPRU). The Ministry of Higher Education and Scientific Research (MESRS) funds this type of scientific activity under the annual budgets of academic institutions and research. The remaining projects were distributed among the National Research Program (NRP) with 25% and 9% ANDRU. We further note that 19% of scientists who we interviewed did not feel concerned by these projects, since they are integrated into other research programs (see Table 3).

Additionally to the previous findings, it is important that all this scientific production has to be evaluated. Hence, to make this assessment operative one must develop indicators which are quantitative measures defining the status and dynamics of the research system. The following part will therefore enable us to analyze better the awareness of knowledge of Algerian scientists on methods, criteria and indicators for evaluating scientific research. This part of the study is essential for elevating their expectations regarding access to evaluation indicators and their ability to meet the requirements of performance evaluation.

3.4 Research evaluation as seen by Algerian researchers

In the following we will discuss the results of the interview with Algerian researchers concerning their grading of knowledge, according to different criteria and evaluation methods. It is important to remind that our information system for the management and dissemination of knowledge has a special interest in the production of performance indicators.

3.4.1 Perception of evaluation by Algerian researchers

A high rate of scientists has a real perception of evaluation procedures; 55% believed that the quality of scientific research is measured by an evaluation committee and 45% considered that an evaluation is achieved by the presentation of a progress of research report, what is called a "midterm and final assessment report" as summarized in Table 4.

In fact the current evaluation of scientific research in various Algerian research institutions is based on evaluation reports midterm and final. It should be noted that the Law 98-11 prescribes that the period of execution of research projects (CNEPRU, NRP) is three years and must undergo an evaluation every six months to assess their progress, as well as a final evaluation at the project ending.

National Plan	Abs. freq. of responses	Percent
No answer	80	19%
National Research Program (NRP)	104	25%
National Commission for Evaluating University Research Projects (CNEPRU)	176	42%
National Agency for the Development of University Research	38	9%
Institutional projects (except ministries)	25	6%
Total	423	100%

Table 3. Type of the national plans of the research projects.

Procedure of evaluation	Abs. freq. of responses	Percent
Committee of evaluation	236	55%
Evaluation by semi and final report (project/ research report)	196	45%
Total	423	100%

Table 4. Distribution of the procedures of current evaluation of the scientific research in Algeria

Evaluation research	Abs. freq. of responses	Percent
Quality of scientific publications	300	28%
Number of patents	105	10%
Amount of the innovation activities	116	11%
Contribution to economic activities	178	16%
Contribution to education	219	20%
Level of knowledge	169	15,5%
Total	1087	100%

Table 5. Criteria of evaluation for scientific research

3.4.2 Measuring outcomes and research impacts

Besides the formal regulation of the evaluation, we wanted to know the perception of Algerian researchers how to measure outcomes and impacts of research and which indicators could be applied to measure the scientific output and impact. Scientists estimated that publications are the main indicator for an evaluation (28%, see Table 5), which allows us to understand that research evaluation for them is based primarily on the dynamics of scientific output of the researcher, the rate of citations of articles by patents, and references to scientific articles in international regulations or expertises. Contribution to education is seen as an evaluation criteria by 20%. Scientists believe that research can be used for training by transforming the knowledge and know-how competence which are then mobilized in the socio-economic sector by the socio-cultural experience of the researchers. This is achieved by the activity and mobility of researchers with expertise activities for companies and public authorities, participation in publicity activities linking research and the public via media, as well as the contribution to economic activities and the training of researchers and freshmen recruited by the industry.

The impact of research on training as evaluation indicator was followed by a lower percentage of the contribution to economic activities with 16% and by the level of knowledge production, such as science parks and multi-network construction (15.5%). Scientists believe that these types of assessment can help to select such research results that will participate in a process of economic recovery. The latter results in the innovation of products or processes that are allocated in the economic and industrial sector as raw material. In contrary, the measurement of the intellectual properties, namely the activities of innovation with 11% and the number of patents with 10% received less interest by researchers and academics.

3.4.3 Cognizance of indicators as bibliometric measurement

According to the survey participants, the types of measurement indicators that are seen useful for assessing the production of a researcher provide highly variable results as general tendency.

Concerning the researchers knowledge on indicators of scientific activity, slightly more than half of the scientific community interviewed (54%) had a good knowledge of indicators of the bibliometric measuring type, but 34% seemed to ignore these techniques, and 12% had no opinion on this subject.

Now let us have a look to the types of indicators that seem to be a useful measure for researchers to evaluate the production of a researcher (see Table 6). 24% believed that the evaluation of output of a researcher is based on the number of publications and articles in journals that have an impact factor strong enough and are indexed in scientific databases for both types of indicators (indicator of scientific production and visibility indicator), while 15% believed that indicators should measure relational features depending on the number of co-publications with other researchers. The number of co-authorships for publication is an indicator which measures the interactions

and relationships between scientific networks, teams, and institutions, with respect to national or international cooperation.

In contrast, the rate of growth of the discipline (8%) and the immediacy index (7%) received less interest by the interviewed researchers. It seems that interest in the trends of a topic, as well as comparisons between the journals in research priorities ("hottest topics") is negligible in the Algerian scientists. This may suggest once more that the themes of agricultural research of our population remain largely questioned classics (like Table 6).

Type of indicators	Abs. freq. of responses	Percent
No Answer	145	22,5%
Indicators of scientific production	152	24%
Indicators of visibility	157	24%
Relational indicators	94	15%
Growth rate of the researchers discipline	53	8%
Development of comparisons between specialized journals in the current research (classifified by immediacy index)	43	7%
Total	644	100%

Table 6. Metric Indicators of research quality according to their utility for the Algerian researchers

4.0 Potential of a national observatory on agricultural research in Algeria

The agreement expressed by researchers and academics to participate in the support of the future information system reflects a strong collective interest for such a project. The majority (97%) was ready to report their research. Those opposing (3%) highlighted the risk of plagiarism of their work and the problem of uncertainty of protection of their scientific data. The documents they are willing to upload to the information system were primarily scientific articles (31%), followed by papers, respectively theses (each 24%, see Table 7).

Their motivations to document their research activity are mainly: the exchange of scientific and technical information (32%), value enhancement of results (31%) and recognition by the scientific community (20%). However, we have to note that the concept of intellectual capital is unimportant for these scientists, given the low acceptance of sustainability for their data (15%). Hence, how can they leave traces of their knowledge to the next generation of researchers?

Type publication	Abs. freq. of responses	Percent
Articles	270	31%
Books	78	9%
Papers	214	24%
Reports	87	10%
Theses	208	24%
Patents	21	2%
Total	878	100%

Table 7. Types of publication to be deposited in the information system.

5.0 Conclusion

Our survey interest was to get authentic information by the concerned researchers how to create a model of an information system supporting knowledge transfer in agricultural research in Algeria. To achieve this level of development support by an information system on agricultural research, it must meet at least two major challenges:

- Production of evaluation indicators as development support: to evaluate better the research plan, based on priorities of economic development; and,
- Transfer of knowledge of agricultural research with the aim to integrate our knowledge, as a raw material of development: therefore it helps to organize knowledge and to transform it into a source of production.

This study has allowed us to highlight not only the strengths but also the weaknesses of an assessment of researcher needs in respect to a national information system on agricultural research.

5.1 Strengths and opportunities

5.1.1 A scientific production in agricultural research in Mediterranean cooperation

At research institutions the encouragement for bilateral cooperation with France (or francophone countries) is mostly present. Multilateral cooperation is generally directed towards the technical support institutions and agricultural development, with high-level specialized agencies that contribute to the development of agricultural research (FAO, EU, ECE, OHADA, ICARDA). Our investigation shows that the most dominant form of research projects is part of a privileged space for building cooperation in the Mediterranean countries.

5.1.2 A review of research based on the impact of cited articles

This strong attention to the metrics of citation, i.e. a measure of "consumption" of scientific results, pushes researchers to publish in a recognized scientific quality journal. If they are doing so, they make profit of significant benefits from the global scientific community.

5.2 Weaknesses and risks

5.2.1 Separation in terms of integration with community networks

There is a significant risk to withdraw completely relational networks in the development of agricultural research projects nationally and internationally. The dispersion of scientific production due to institutional fragmentation and lack of contacts between researchers causes duplication of scientific projects. We also highlighted the fragmentation of the integration of Algerian scientists and/or research teams in the international exchange networks.

5.2.2 Lack of methods for evaluating research

The disinterest of researchers towards the content of the evolution of science in a particular discipline has an effect of inactivity in advancing their research. Overall, the data reveal a critical need to create an appropriate information framework for planning research projects in conjunction with the socio-economic development and evaluation of research results in agronomy. In the light of these results, Algeria must take up a challenge by creation of an information system of production and diffusion of knowledge as regards agronomic research, while guaranteeing the aspects which we recommend in these following points:

- An access federated to the national bibliographical databases, the scientific full texts and the collaboratives platforms.
- A strategic space of collective intelligence. The installation of the system informational constitutes an element of valorization of the scientific production.
- A space of exchange and informational resource sharing and competences scientific.
- A space of management of the capital of collective knowledge, while circulating shared knowledge.

5.2.3 Contributions of the project of the observatory on the agronomic research in Algeria

Now we present the project of the national observatory of the Algerian agronomic research. It is proposed the creation of an information system innovating to manage and share knowledge on the organizations, the laboratories, the research projects, competences, the publications and the partners of the national agronomic research. It will facilitate the implementation of the policy of research and will allow the evaluation of the results in terms of innovation, publication, partnership agreements and transfer of competence. It also aims at the creation of synergies between the national research programs, and that and research sector of the economy.

The installation of the information system on the agronomic research in Algeria, rests on:

- The creation of an information system integrated on the national device of research.
- Production of indicators with national dimension of existing data (databases of the projects, the experts and the results of research) intended for management, the evaluation and the planning of research.

These indicators will be produced directly from the information system. They will make it possible to have cartography of the agronomic research in a national context: the sets of themes covered by the agronomic research, the coverage of the national economic priorities by research, the scientific level of production compared to the priorities, the distribution of the researchers by specialities and identification of competences to be consolidated. The production of indicators with international dimension intents to position the Algerian agronomic research in a context and according to international standards. The information source will be an international database offering indicators of notorieties of Algerian scientific publications.

Thus a collective space of communication will be constructed, which supports remote work, in group, collaboration for the management and the division of the knowledge and the scientific knowledge. The required system will include three spaces distinct from access to information:

- Databases federated on the national device of research.
- Spaces of access to international information and exchanges: news, exposures, forums.

– A search engine, on the databases of the national device of agricultural research.

Moreover, the project of the information system on the Algerian agronomic research aims to produce indicators of evaluation for a better management and a better planning of the agronomic research. It is thus envisaged to be able to know:

– The themes best covered by the research projects,
– The level of covering the economic development actions of the country and the research activities,
– Poles of competencies and in contrary the specific deficits in research,
– The notoriety of the articles indicated by the impact measure of the reviews in which they are published.

In consideration of the multifunctionality of this information system, it will be necessary to think about a harmonization of a uniform, controlled vocabulary. Without going into detail we present now a general view of the main functions of the information system.

5.2.3 General Functional Description

The main functions of the information system are defined by:

– A search for information in the form of two modes: public access (information limited to the researchers) and access for the research management (more complete tools for information exploitation of the data).
– A means of acquisition intended for the managers of the institutions.
– A posting of results of a search. Objects taken into account here: institutions, departments/stations, laboratories, departments, projects, publications.

The query interface of the system will be presented like a Web page. We offer all query possibilities. Accordingly, it is possible to retrieve data of the information system whatever their nature, e.g. it could be a search in full text over all the headings of all the tables. Further features will be:

– A field allowing to select the required words.
– A possibility to limit the research objects.

All these key tables and words were developed starting from several thesauri such as "Agrovoc" (Agricultural Information Management Standards and "Agris" (International system of information for Agricultural Sciences and Technology). We think, in the future it will be necessary to harmonize these languages in only one common thesaurus, what implies much research on multilingual thesauri construction. (English, French, Spanish, Chinese and Arabic).

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