

Valorisation of agricultural scientific production in Algeria: Modes and criteria for the evaluation of scientific research

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Abstract :

In Algeria, the results of agricultural research must be translated into innovation, creating new processes for agricultural enterprises. So, scientific research can improve and increase production and become the activity and the support for the country development. The aim of this work is to have a visibility of the scientific production of Algerian researchers to determine the scientific and technical production type of Algerian researchers, and their preferred partnership type in research projects for innovative.

Keywords: Scientific production, Evaluation, Scientific research, Agronomy, Algeria.

Résumé :

En Algérie, les résultats de la recherche agricole doivent être traduits en innovation, en créant de nouveaux processus pour les entreprises. De ce fait, la recherche scientifique peut améliorer et augmenter la production, ainsi que le soutien pour le développement économique. L'objectif de cette étude est de connaître la visibilité des chercheurs algériens en agronomie pour déterminer leur type de production scientifique et la nature de partenariat de projets pour le développement des procédés innovants.

Mots clés : Production scientifique, Evaluation, Recherche scientifique, Agronomie, Algérie.

I. INTRODUCTION AND PROBLEMATIC

Scientific activities perform a fundamental role in our societies. Therefore, the definition of programs and research topics must be translated into socio-economic programs' policy by government and corporate priorities as the needs of the country. The whole point of research programs, as specified by the report of the expert board on science and technology, emphasizes that "for 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"(1).

Thus, research becomes a multidimensional activity and must simultaneously contribute to the production of certified knowledge, public goods, professional skills, also to contribute to the construction of techno-economic networks, linking the world of research in economy so as to create a homogeneous space which encouraging housing relationship.

In Algeria, the results of agricultural research in which we are especially interested in the context of this work, must be translated into innovation, creating new processes for agricultural enterprises. In this case, scientific research can improve and increase production and become the activity and the support for the country development. Nevertheless a strong intellectual capital in Algeria, the developed skills that involve contributing to the development of their scientific production: if it is accessible and potentially exploitable?

Indeed, decision-makers, scientists and development actors in Algeria do not have sources of information and scientific knowledge to assist decision-making, in defining programs of research and evaluation of scientific production. According to O. Anseur, 75% of Algerian researchers specialized in agronomy agree on the lack of mechanisms for research transfer results and 86% believe that the national scientific production is not accessible because of the lack of tools of the scientific production (2).

Alone, scientific research is not sufficient to ensure sustainable development. It must be information systems capable of managing and acquiring knowledge. To register in development logic, scientific research to become as "shared social goods", researchers need to develop tools for visibility and analysis of their activities.

Algeria has significant intellectual resources (universities, schools, institutions, researchers, lecturers and university students), but how to enable it to use that capital as recommended by all development specialists and J.-L. Ermine summarized it such: "slogans to invest in production-standard production tool or optimize the organization of labor now adds the slogan 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"(3).

Answering to these questions requires the proposal a model of information system designed to make all these links between actors involved in research and development. This question concerning the establishment of mechanisms for knowledge Management (KM) 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 asked to meet this goal out of any consideration about information system model. The main question that arises is: What are the relevant indicators to be produced for the evaluation of scientific production through the future information system?

The objective of this work is to have a visibility of the scientific production of Algerian researchers to determine the scientific and technical production type of Algerian researchers, and their preferred partnership type in research projects for innovative development.

As far as the evaluation is concerned, it will allow us to analyze the level of awareness of researchers on methods and criteria for evaluating scientific research. On which criteria are based the researchers to identify a recognized review as high quality? What are their indicators' perceptions to measure science and to assess the scientific production? And finally, how can they know generally the socioeconomic impacts of the research?

II. Methodology and investigation conduct

We conducted a large national survey that had attracted the participation of over three hundred 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 and 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. Return on these two approaches reveals that the qualitative survey and pre-test were very effective in gathering opinions. It is due to the fact that the comments we have published were more personal and subjective.

Therefore, it is important to note that the start of our study by the qualitative survey allowed us to understand the mechanisms of thought and behavior of the investigated

scientific community. A total of 500 set of questions were distributed. The gathering lasted five months (February -June 2008). We received 395 returns of which 345 usable, a rate of 69% of accepted responses.

Algeria is facing on challenge by creating an information system of production and dissemination of knowledge on agricultural research. That is what we propose to present as results on an extensive survey that we conducted among more than 300 researchers at the national level.

III. Discussion of results

1. Scientific and technical productions

This component is important to have an opinion on the scientific production of Algerian researchers and the future information system. The answers determined the type of scientific and technical production of Algerian researchers and the type of partnership they focus on innovative research projects for sustainable development.

Scientific production is not negligible; the majority (95%) of respondents have an intellectual productivity. These data are very satisfactory in terms of interactivity science. However, we question whether such knowledge and skills are sufficiently accessible and visible so they can be capitalized and valued.

In addition, we find through this study that researchers give more interest to research news, such as communications (international conferences, seminars, symposia ...), thesis and publications, journal articles over books (cf. Table 1).

Table 1:Type of algerian scientifics work

Type of works	Nb. Cit.	Freq.
Articles of periodic	215	25%
Books	41	5%
Reports	117	14%
communications	256	30%
Thesis	231	27%
Total Quotations	860	100%

In fact, the main reasons for this dominance for this type of scientific work are obvious, since this is strongly linked to the careers of researchers. In general, the performance of the researcher is recognized. In this way, it is imperative for Algerian researchers and also academics to publish their results in national and international journals which have an impact factor communicating them through scientific meetings that are increasingly required to advance their scientific careers; 70% of scientists with PHD claim to publish in journals with impact factor.

In contrast, academic books are virtually absent in the production of scientists. They prefer papers (articles) compared to the work books because these last require much more time and resources for their publications.

1.2. What used language for Algerian scientific output?

The dominant language of publication is French with a proportion of 68% for a minority of 28% in English with insignificant percentage rate of 4% for Arabic language. These results are explained by the fact that higher education was mainly exempt in French, and the inadequate level of proficiency in English (cf. Table 2).

Table 2: Distribution for the scientific productions by language

Scientific language production	Nb. Cit.	Freq.
French	320	68%
English	131	28%
Arabic	18	4%
Total Quotations	469	100%

This dominance of the French language production is due to a major problem: The difficulty for scientists to publishing in Anglo-Saxon journals, called "prestigious". These results raise the issue of integration of Algerian scientists in 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 trade, which now use the English language as a way to publicize and / or issue debates and high-level scientific cooperation.

Regarding the crossing of two variables "publications in journals with impact factor" and "language production", we note that only 40% of Algerian scientists have published in journals with impact factor in the English language.

Given these results, we note a serious issue which concerns an aspect of "language" which inhibits the Algerian scientists to be open to the world without borders, to fit into social networks of scientists and innovative research projects in promising areas.

1.3. What assessment of Algerian researchers for journals with impact factor?

At the main of this knowledge production and innovation, scientific journals are used as an indispensable vehicle for the dissemination to innovative research. To the question "whether the researcher has published in journals with impact factor? This challenges us the problem of language production that greatly reduces the chances for submission of papers in journals with impact factor published by learned societies or academies.

Compared to this observation, our results reveal that 54% of researchers are unable to publish in these journals. Those who had the privilege of awareness represent only 37%. Henceforth, it has become necessary to publish in major journals for the American and British recognition of the work and for obtaining permission of the thesis for PHD or habilitation research, and even to get proposal of academic professor.

1.4. Research projects of Algerian researchers

In addition to the scientific output of Algerian researchers that we have analyzed, in addition to their work on research projects, many are registered under the International Cooperation and they work in institutions of higher education and research entities. The study on these projects has enabled us to understand the structure of national and international collaborations and with which partners agree the most cooperative and privileged.

These data highlight the high rate of 88% of researchers and academics engaged in research projects.

Indeed, the bi-variate analysis of two variables that focuses on relationships between types of research projects and graduation scientists shows that 90% of researchers integrated into institutional projects have a PHD, 40% of graduates Master degree or "Magister" are engaged in their PHD projects, and few are 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. In this alternative vision, 42% of projects in progress are conducted in university official (National Committee for appraisal and planning for university research CNEPRU).

The Ministry of Higher Education and Scientific Research (MESRS) funds, under the annual budgets of academic institutions and research for this type of scientific activity. The remaining projects are distributed among: the NRP with 25% and 9% ANDRU.

We further note that 19% of scientists that we interviewed did not feel concerned by these projects, since they are integrated into other research programs (cf. Table 3).

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

National Plan	Nb. Cit.	Freq.
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%
Establishment projects (except ministries)	25	6%
Total Quotations	423	100%

Beyond the foregoing, it is important that all this scientific production is evaluated. Thus, to make this assessment operative one must develop indicators that are quantitative measures that define the status and dynamics of the research system.

The following part will therefore enable us to better analyze the level of knowledge of Algerian scientists on methods, criteria and indicators for evaluating scientific research. This component is essential to measure their expectations regarding access to evaluation indicators and their ability to meet the requirements of performance evaluation.

2. Evaluation of research among researchers in Algeria

We present the results of the review of Algerian researchers to determine their levels of knowledge, in terms of different criteria and evaluation methods.

2.1. Viewing evaluation by Algerian researchers

A high rate of scientists has a real perception on the valuation methods, 55% believe that the evaluation of scientific research is measured by an evaluation committee and 45% consider that the evaluation is done in the presentation of a progress of research report, what is called an " midterm and final assessment report " (cf. Table 4).

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

Mode evaluation	Nb. Cit.	Freq.
Committee of evaluation	236	55%
Semi and final of evaluation Report (project/ research report)	196	45%
Total Quotations	423	100%

The current evaluation of scientific research in various Algerian research institutions are based on evaluation reports midterm and final. It should be noted that the Law 98-11 provides that the period of execution of research projects (CNEPRU, NRP) is 3 years and they must undergo an evaluation every six months to assess their progress, and a final evaluation at project completion.

2.2. Measuring outcomes and research impacts

Beyond the formal regulatory review, we wanted to know the perception of Algerian researchers on measuring outcomes and impacts of research and indicators that can be produced to measure the outputs and impacts.

Scientists estimate that the publications are the main indicator for evaluation (28%), which brings us to understand that research evaluation is based primarily on the dynamics of scientific output of the researcher, the rate of citations of articles by patents, references to scientific articles in international regulations or expertise.

Contribution to training is seen as an endpoint with a rate of 20%. Scientists believe that research can be mobilized for training to transform the knowledge and expertise in skills which are then mobilized in the socio-economic, socio-cultural experience through the researchers.

This is done from the measurement of activity and mobility of researchers with expertise activities for companies and public authorities, participation in activities linking research and the public through the media and the contribution to economic activities and training of young researchers recruited by industry.

The impact of research on training is followed by a smaller percentage for the contribution to economic activities with 16% and the level of knowledge production, such as science parks and multi-network construction (15.5%).

Scientists believe these types of assessment can help select the search results that will participate in a process of economic recovery. The latter concludes with the innovation of products or processes that are mobilized in the economic and industrial sector as "raw material".

However, the measurement from the intellectual property, namely the activities of innovation with 11% and the number of patents with 10% receive less interest from researchers and academics (cf. Table 5).

Table 5: Criteria of evaluation of the scientific research

Evaluation research	Nb. Cit.	Freq.
Level of the scientific production	300	28%
Number of patents	105	10%
Volume of the innovation activities	116	11%
Contribution to economic activities	178	16%
Contribution to the training	219	20%
Level of knowledge	169	16%
Total quotations	1087	100%

2.3. Knowledge of indicators in the bibliometric measurement

Generally according to the survey participants, types of measurement indicators that are useful for assessing the production of a researcher provide highly variable results. On researchers knowledge on indicators of scientific activity, slightly more than half of the scientific community questioned (54%) has a good knowledge of indicators measuring bibliometric types, 34% seem to ignore these techniques, 12% have no opinion on this subject.

As for the types of indicators that seem useful measure for researchers to evaluate the production of a researcher, 24% believe that the valuation 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) (cf. Table 6); while 15% believe that indicators are measuring by relational types depending on the number of co-publications with other researchers. The number of co-signatures for publication is an indicator that measures the

interactions and relationships between scientific networks, teams, institutions, national or international cooperation.

In contrast, the rate of growth of the discipline (8%) and immediacy index (7%) received less interest from researchers interviewed. It seems that the interest in the trends of a topic, as well as comparisons between the journals in research priority «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.

Table 6: Indicators of measurement of research according to their utility in the Algerian researchers.

Type of indicators	Nb. Cit.	Freq.
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 the comparisons between the specialized reviews in the latest research	43	7%
Total quotations	644	100%

4. National Observatory power on Agricultural Research in Algeria

The agreement expressed by researchers and academics to participate in the supply of future information system reflects a strong collective interest for such a project. The majority (97%) is ready to post his research. Those opposed (3%) highlight the risk of plagiarism in their work and the problem about the uncertainty protection of their scientific data.

The documents they wish to upload on the information system are primarily scientific papers (31%), followed by communications and theses, respectively (24%) (cf. Table 7).

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

Type publication	Nb. Cit.	Freq.
Papers of periodicals	270	31%
Books	78	9%
Communications	214	24%
Reports	87	10%
Theses	208	24%
Patents	21	2%
Total quotations	878	100%

Their motivations to file the research are mainly: the exchange of scientific and technical information (32%), recovery results (31%) and recognition by the scientific community (20%).

However, we note that the concept of intellectual capital is insufficient to these scientists, given the low response related to the sustainability of their data (15%). In this case, how can they leave traces of their knowledge to the successors of the research?

IV. Conclusion : Our problematic was on the interest that the proposal could create a model of information system focused on knowledge management (KM) in agricultural research in Algeria. To achieve this level of development support through an information system on agricultural research, this last must meets, including two major challenges that concern:

Production of indicators for evaluation, development support: to evaluate better the research plan, based on priorities of economic development;

The knowledge management of agricultural research, to integrate our oil gray, as a raw material development: it is therefore to manage the knowledge to transform it into a source of production.

This research has allowed us to highlight not only the strengths but also weaknesses of this study that needs assessment researchers to face a national information system on agricultural research. Strengths and opportunities

- **A scientific production in agricultural research in Mediterranean cooperation.** Encouragement for bilateral cooperation with France is more present at research institutions. Multilateral cooperation is generally geared 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 research projects most dominant form part of a privileged space for building cooperation in the Mediterranean countries.
- **A review of research based on the impact of the papers cited.** This strong attention to the metric of citation, ie. a measure of "consumer" of scientific results, pushing researchers to seek publication in a recognized scientific journal quality. Doing so, they enjoy significant benefits from the global scientific community.

Weaknesses and risks

- **A partitioning in terms of integration with community networks.** There is a significant risk to withdraw completely associative 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 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.
- **A 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 inactive in advancing their research. Overall, the data reveal a critical need to create an appropriate framework for decision making for planning research projects in conjunction with the socio-economic development and evaluation of research results in agronomy.

Notes

- (1) Excellence en science et en technologie dans la fonction publique. Rapport du conseil d'expert en science et technologie. Août, 2001, p.8. URL : <http://www.csta-cest.gc.ca>
- (2) **Anseur Ouardia. (2002).** Usages et besoins informationnels du chercheur dans le secteur agricole algérien. Thèse de magister, Université d'Alger, 2002, p.87.
- (3) **Ermine Jean-Louis. (2003).** La gestion des connaissances. Paris, Lavoisier, 2003, p. 15.

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