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Scientific Research Laboratories and Their Role in Advancing and Producing Scientific Knowledge - A Field Study at the Abbes Laghrour University Laboratories in Khenchela

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Abstract:

The university is regarded as a social and scientific entity concerned with bringing researchers and scientific competencies together to benefit from their human and material potential in order to improve social and economic conditions in society. It also significantly contributes to the performance of the scientific research function as well as the preservation of cultural heritage and values in a qualitative composition of human resources eager to carry out the process of research and scientific knowledge production. We wanted to shed a light on Algerian universities in order to identify research laboratories and competencies in the process of producing scientific knowledge.

Keywords: Scientific Research, Laboratories, Scientific knowledge, Algerian universities

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An introduction:

The university is regarded as the first and most important source of intellectual capital for creating, developing, and investing. Its goal is to develop scientific competencies capable of advancing in technological and scientific research.

Scientific research is considered to be the backbone of countries through what is provided by laboratories, centers and research units. They crystallize the various knowledge that contribute to advancing the development of the individual and society in various fields: social, health, technological, economic, cultural, and military... to meet the necessary needs of society, and achieving self-sufficiency, and then reaching the well-being and renaissance of society by paying attention to all areas without neglecting any of them.

Since recent years, Algeria has attached great importance to this, as evidenced by Prime Minister (Ayman Abdel Rahman) highlighting through the Algerian News Agency that: "spending on scientific research and development reached approximately 57 billion dinars between 2015 and 2021, that is, a rate exceeding 8 billion dinars per year, that is, the equivalent of $400 million in scientific research and technological development during the last seven years….These investments have enabled the creation of many basic structures for research, especially research laboratories, the number of which reached 1,661 laboratories at the end of 2021, in addition to 29 research centers and 43 units. Research and 24 experiment stations, as well as a number of technological floors, technical platforms and incubators." **(Algerian News Agency: https://www.aps.dz/ar/economie/123601-57)**

Similar to the presence of laboratories in the technical sciences, which have great importance in society, we also find the importance of laboratories in the human and social sciences. In the social sciences, for example, we find those that are interested in studying various social phenomena in an organized scientific manner, and continuously strive to provide mechanisms that limit the spread of negative social phenomena, which hinders the development of any society; Among the most prominent laboratories in the social field that are concerned with family social issues (such as divorce, education..., the spread of drugs, unemployment, manifestations of violation of women's and childhood rights, youth problems... we find in sociology:, the laboratory of Family, Development, Prevention of Delinquency and Criminality, at the University of Algeriers2 Abu El Kacem Saadallah, which is managed by **Professor Sabah Ayachi**, who has made great and continuous efforts since its founding in 2012 to this day, as she has presented several practical projects that contribute to the development of social policies by providing tangible social and

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health services to the family, women, childhood, adolescents, youth, people with special needs, and the elderly. Despite the lack of provision of the necessary capabilities for it.

In this study, we will focus in particular on the Abbas Laghrour University in Khenchela, which receives great attention. This is due to the role of its research laboratories in developing intellectual production capacity, which seeks evolution, knowledge, and science. These laboratories are considered as the driving force and nerve center for social, economic, and intellectual development, and they play an important role in the university's intellectual and educational life.

I. The Problematic :

The university is an academic institution that provides knowledge to urban society. It is an important part of every country's scientific and economic life. The university's function is related to scientific research, which contributes to national progress and development, as well as the preservation of valuable cultural heritage. Universities also contribute to the development of competencies and skilled searchers for the generation of scientific knowledge.

In fact, the university's role is not limited to providing scientific knowledge, it is linked to the extent to which it produces scientific knowledge in various fields, as well as its innovation and invention of scientific knowledge. As advanced societies and developing countries recognize the role that universities play in developing and serving communities, they have placed a high value on providing and establishing research laboratories. The rules for establishing and organizing research laboratories, as well as their operations, have been defined by Executive Decree (99-244)" **(Official Gazette of The People's Democratic Republic of Algeria (1999), p5)**

This is due to its intellectual creation and production abilities. The University of Abbas Laghrour in Khenchela, like other Algerian universities, has research laboratories through which it seeks to utilize intellectual capital, primarily in the form of research competencies, and contributes to the production of scientific knowledge. This is the subject of our paper, "Research Laboratories and Their Role in the Development and Production of Scientific Knowledge: A Field Study at the University of Abbas Laghrour in Khenchela."

We will cover the following steps in this field study at the University of Abbas Laghrour in Khenchela: identifying the problem and main question, formulating hypotheses, defining the study's concepts, and finally analyzing and demonstrating the results in light of the hypotheses for discussion.

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This raises the following query:

- What role do research laboratories play in scientific knowledge production?

We can use the following sub-questions to simplify the study:

1- How do members of research laboratories contribute to scientific knowledge production?

2- Can the administration's financial resources effectively contribute to the production of scientific knowledge by research laboratories?

3- What are the barriers to scientific knowledge production that research laboratories face?

II. Study Hypotheses :

Hypotheses are one of the necessities of scientific life and play a crucial role in scientific progress. They are tools by which researchers assist in proper interpretation. They serve as a fundamental tool in scientific research. In many cases, the hypotheses imagined by the researcher are derived from observations, significant discoveries, or innovative experiments, even if they were originally based on incorrect assumptions" (**El-Saouli, M. & Mubarak, M. (1992), p 19).**

The hypothesis of this study has been defined as the following:

The main hypotheses:

- The scientific research laboratories play a significant role in the production of scientific knowledge.

The sub-hypotheses have been translated as follows:

1- The First Sub-hypothesis:

- Members of research laboratories contribute to the production of scientific knowledge.

2- The Second Sub-hypothesis:

- The financial resources allocated by the administration are capable of producing scientific knowledge by research laboratories. **(Mashhukh, Ibtisam. (2011/2012), p. 141).**

3- The Third Sub-hypothesis:

- There are obstacles that hinder research laboratories in the production of scientific knowledge.

III. Study Objectives:

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The field study aims to identify research laboratories and research competencies in the process of producing scientific knowledge within the university environment.

IV. Study Importance :

The significance of research laboratories in knowledge production stems from their status as official institutions with goals such as providing scientific knowledge that aligns with the requirements and various needs of society, all while being overseen by research competencies within the university. The importance of scientific research laboratories and their role in the development and production of scientific knowledge is emphasized, emphasizing the significance of fieldwork and scientific research. This topic has aroused the interest of researchers who want to learn the truth about the most significant obstacles and challenges that universities face when producing scientific knowledge.

V. Concepts :

A. Scientific investigation Laboratories:

These are modern university organizations comprised of a group of researchers divided into research teams, each led by a responsible person. There is also an overall laboratory manager who is in charge of organizing research in specific areas of expertise in order to organize the knowledge production process in accordance with the set objectives. Within the university, research laboratories play an important role in advancing scientific research. It also has a moral foundation, which is embodied in the legal framework that governs these teams through accreditation granted by the supervisory authority for laboratory establishment and approval.

Research Competencies of Research Laboratories: These are university-employed professors and researchers who have academic degrees, scientific ranks, and scientific and research experience that qualifies them to conduct scientific research. Regardless of academic rank, their research contributes to the production of scientific knowledge and serves society, university research, the industrial sector… and humanity" **(Ferhati, Belqassem El Arbi. (2016), p 15).**

Algerian Universities: These are scientific institutions that help to develop scientific personnel, frameworks, and competencies among researchers. They work to create and disseminate scientific knowledge through theoretical and applied methods, primarily through research and scientific studies conducted in laboratories, research teams, or individually. This contribution is aimed at the advancement and

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development of society in a variety of fields. Algeria's scientific research network includes 639 laboratories housed within national universities". **(SaiFour, Salim. (June 2015), p159).**

B. Scientific Knowledge:

This refers to the creation of scientific knowledge through the efforts of professors and researchers from scientific research teams at Algerian universities. This output includes intellectual and scientific contributions in the form of scientific publications, articles, intellectual forums, international and national conferences, workshops, and research, either individually or in the laboratory, all of which contribute to the production of knowledge.

VI. Study Fields:

- Spatial Field: A field study conducted in collaboration with the research laboratories at Abbas Laghrour University in Khenchela.

- Human Field: The directors and members of the nine (9) research laboratories- Temporal Field: The research was conducted at the University of Abbas Laghrour in Khenchela from December 15, 2021 to January 11, 2022. This time was set aside for information gathering, which included interviews with the Deputy Director in charge of higher education in the third cycle, academic research, and postgraduate education at the University of Abbas Laghrour. Following that, the time was spent distributing research questionnaires and conducting multiple interviews with laboratory heads and members." **(http://www.univ-khenchela.dz/ (22, 2017), List of Accredited Laboratories at the University)**

.Study Resarch Population and Sample:

The sample is a subset of the study resarch population that was chosen in a specific way for the purpose of conducting a specific study. The findings from this sample are then extrapolated to the entire original population. **(Angers, Maurice (2006), p101).** One of the most important steps that researchers face in their research is the process of selecting and determining the sample. The sample must represent the entire research population and include all of the characteristics and features unique to the population from which it was drawn.

In the context of our study, the research community consists of (9) research laboratories at the University of Abbas Laghrour in Khenchela. Due to the small sample size, we used a purposive sampling method to create a comprehensive survey sample**" (Angers, Maurice (2006), p 102).**

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VII. The Methodology Used in the Study:

Methodology refers to the procedures used to comprehend the phenomenon or problem under investigation. In the context of the current study, descriptive methodology is used. It aims to describe and diagnose the phenomenon under study, collect data and facts, categorize and tabulate them, as well as provide adequate analysis, including the interpretation of the results, and eventually arrive at generalizations about the phenomenon under study.

VIII. Data Collection Tools (Field Research Techniques):

The suitability and accuracy of the data collection tools used are critical to the research's success. The following tools were chosen:

A- Observation: Direct observation of research laboratories was used from the beginning of the study. Observation was also used during questionnaire completion, when various observations were made, such as deep thinking before answering.
The response speed and slowness.
Physiological modifications

B- Questionnaire: According to Maurice Angers, a questionnaire is "a direct technique for scientific investigation used with individuals, allowing for focused questioning." **(Angers, Maurice. (2006), p105)**

I attempted to formulate questions in the research questionnaire that would allow us to understand the hidden aspects of the studied phenomenon, which can only be revealed through a series of questions posed to the sample individuals.
The questionnaire's questions are written in a straightforward and understandable manner for all of the individuals being studied, including the heads and members of the research laboratories.

-Typically, the questionnaire contains two types of questions:
Specific Concerns: The questions in this type are precisely phrased with closed answers (yes/ no), making it easier for the researcher to collect data and reach conclusions supported by percentages, such as:
Do members of the research team contribute to the implementation of the planned programs? Yes No. - Do the research findings contribute to the development of the university's intellectual capital? Yes No - Are there enough human resources to conduct research? Yes No. - Are university laboratories adequate for producing scientific knowledge? Yes No - Is the budget set aside by the supervisory authority adequate? Is the laboratory equipped with the necessary materials? Yes No. - Is a lack of experience among research team members considered a barrier to scientific knowledge production? Yes No

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Questions with open answers: Respondents are given the freedom to express their opinions freely in this type of question. Among the open-ended questions are:

The First Axis: Information about research laboratory members.

- What is the name of the laboratory you work in?
- How many projects are you working on?
- How many research teams exist?
- What are the laboratory's most important responsibilities?

Why, if you answer "No"?

In the case of a "Yes," how so?

The Second Axis: Information about material resources.

- How much money is set aside for research laboratories?
- What kind of materials are used in research laboratories?

The Third Axis: Information about the challenges that research laboratories face.

- What are the impediments to research laboratories fulfilling their role in the production of scientific knowledge?

At the University of Abbas Laghrour in Khenchela, the questionnaire aims to measure and reveal the role of research laboratories in Algerian universities in producing scientific knowledge. The questionnaire is made up of 15 questions divided into three categories:

The First Axis: Data pertaining to research laboratory members, including questions 1–7.

The Second Axis: Material resource data, including questions 8 to 11.

The Third Axis: Information about the challenges that research laboratories face, including questions 12 to 15.

The questionnaires were distributed and fully completed.

The number of research laboratories at the university is nine.

Include? the laboratory heads and the year of accreditation.

1- LASPIIA stands for Laboratory of Atomic Structures, Properties, and Interactions. Dr. Djelloul Abdelkader - Since 2007.
2- LCIP stands for Laboratory of Sensors, Instruments, and Patterns. Dr. Benounis Massoud - Founded in 2012.
3- IEDT: Incubation and Local Development Laboratory. Dr. Gherman Rabiai - Founded in 2010.
4- ADET: Translation and Discourse Analysis Laboratory. Dr. Alan Omar - Founded in 2010.

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5- V.CPRISE: Laboratory of Violence, Communication, and the Religious Phenomenon, as well as its Social and Economic Implications. Dr. Al-Aysh Abdul Aziz was founded in 2010.
6- IECC: Interpretation and Comparative Cultural Studies Laboratory. Dr. Hsidd Faisal - Founded in 2013.
7- RJP: Legal, Political, and Sharia Research Laboratory. Dr. Zouakri Tahir - Founded in 2013.
8- ICOSI stands for the Laboratory of Knowledge Engineering and Information Security. Dr. Ramoul Hisham - Founded in 2013.
9- ISMA stands for the Laboratory of Advanced Materials Science and Engineering. Dr. Khemissi Saad Eddine - Founded in 2015.

IX. Study Results Presentation, Analysis, and Interpretation

Presenting field results entails comprehending the data gathered within the research community using tools based on hypotheses and primary study objectives. The questionnaire provides this information.

The First Axis: Information about research laboratory members.

At the University of Abbas Laghrour in Khenchela, we have nine (09) research laboratories.

1- Atomic Structures, Properties, and Interactions Laboratory:

- Project counts: four (04). research teams
- There are four (04) research teams.

Activities: Participation in international and national conferences, as well as supervision of doctoral students and publication of scientific research.

2- Sensors, Instruments, and Patterns Laboratory: - Total number of projects: four (04).

- There are four (04) research teams.

Activities include doctoral thesis supervision and participation in scientific conferences.

3- Business Incubation and Local Development Laboratory: - Number of projects: two (02).

- There are four (04) research teams.

4- Translation and Discourse Analysis Laboratory: - Total number of projects: eight (08).

- There are four (04) research teams.

Activities include organizing conferences, publishing a journal, translating books, and conducting discourse analysis research.

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5- Laboratory of Violence, Communication, and the Religious Phenomenon and its Social and Economic Effects: - One (01) project.

- There are four (04) research teams.

Research on social and economic issues relating to social reality.

6- Interpretation and Comparative Cultural Studies Laboratory: - Total number of projects: four (04).

- There are five (05) research teams.

Activities include international conferences, national seminars, supervising doctoral students, publishing a peer-reviewed scientific journal (Futuhat), and compiling research published in national and international journals are among the activities.

7- Legal, Political, and Sharia Research Laboratory: - Projects: six (06).

- There are five (05) research teams.

Activities include supervising LMD doctoral students, supervising doctoral students in sciences, attending scientific conferences and workshops, and conducting legal research.

8- Knowledge Engineering and Information Security Laboratory: - Number of laboratory-specific projects: two (02).

- There are four (04) research teams.

Research publication, international and national conferences are among the activities.

9- Advanced Materials Science and Engineering Laboratory: A newly established laboratory with no registered projects.

- There are four (04) research teams.

Activities include research publication, national and international conferences, and student supervision.

The answers to the first question, "How do members of scientific research laboratories contribute to the production of scientific knowledge?"

Question 6: Do research teams contribute to the implementation of existing programs?

- Yes: 89%.
- No: 11%.

This is due to the university's current conditions, which include a lack of financial resources, legal regulations governing laboratories, and the absence of a conducive environment for the research process.

Question 7: Do the findings of scientific research contribute to the growth of the university's intellectual capital?

- Yes: 100%.

- No: 0%.

The following factors are responsible for the University of Khenchela's 100% contribution: - The publication of scientific research, particularly in international scientific journals, increases the University of Khenchela's and Algerian universities' global recognition and ranking.

- A large number of national and international scientific articles contribute to the development of technological and industrial solutions.
- The generation of new knowledge in scientific research.
- Providing fresh perspectives on research, particularly on the field and at economic levels.
- Some studies provide answers to many questions that researchers have enquire , while others are considered as solutions to scientific problems and serve as a starting point for future research.
- The laboratory's work is relatively applied, particularly in areas that represent significant assets, as evidenced by the use of these research results to improve the job performance of university staff.

The first hypothesis, that members of scientific research laboratories contribute to the production of scientific knowledge, receives 94.50% support.

- **Results related to the third subsidiary question, which revolved around**:

- What are the challenges that research laboratories face in producing scientific knowledge? As a result, the following occurred:
- Each laboratory has a distinct agenda, as does each research team.
- A very small proportion of scientific output.
- A lack of financial resources and laboratory budgets leads to a low level of scientific research.
- Inadequate planning of educational and office spaces.
- Research laboratories lack the necessary research equipment and tools to conduct scientific research and generate knowledge.
- Low levels of collaboration among university laboratories and a lack of interaction among research team members.
- Bureaucracy in the distribution of financial resources, as well as poor management that does not support research.

The AEDL research laboratory confirms that a sufficient budget is available to cover scientific research projects.

- The Discourse Analysis and Translation Laboratory's director declined to comment on the budget.

- A member of the Violence, Communication, and Religious Phenomenon laboratory did not respond to questions about the budget.

Question 9: Do you have enough human resources to conduct research?

- Yes: Enough, with a percentage of 100%.
- No: 0%.

Question 10: What kinds of materials are used in research laboratories?

IT equipment, internet networks, and offices are examples of these materials or equipment.

- Aside from the ISMA laboratory, the following equipment is available: spectrophotometer, FTIR (Infrared Spectroscopy) for wavelength measurement, and ultrasonic spray.

Concerning the laboratories available for the production of scientific knowledge:

- They do exist with a 44% probability.
- With a percentage of 56%, they do not exist.

This is due to the lack of required logistical coordination. Scientific research necessitates a strong foundation, political backing, and a well-defined strategy at the university level.

It is suggested that specialized research laboratories be provided with the necessary human resources.

The second hypothesis, which states that the financial resources allocated by the oversight authority are sufficient for research laboratories to produce scientific knowledge, is verified with a percentage of 78.00%.

Repetition; The responses to the third sub-question regarding the challenges faced by research laboratories in producing scientific knowledge revealed several key issues. These challenges include:

- Each laboratory operating with its own agenda and each research team pursuing its own program.
- A significant decrease in the proportion of scientific output.
- Financial constraints and budget cuts leading to a decline in research quality.
- Inadequate planning for pedagogical and office locations.
- Insufficient research equipment hindering scientific research and knowledge generation.
- Limited collaboration among university laboratories and minimal interaction among research team members.

- Bureaucratic obstacles in resource distribution and ineffective management hindering research activities.

Administrative roadblocks are common.
Question 13: What is the oversight authority's budget?
- Yes, with a percentage of 22%, sufficient.
- No: 78%.

The reason is a lack of meeting research needs and financial support for the laboratory, which leads to the suggestion of allocating a budget to each research team based on productivity.
- Expensive specialized equipment is required for precise scientific testing.
- Requesting collaboration with international laboratories.
- Requesting agreements with industrial institutions.
In practice, there is no budget for scientific research at the ISMA Advanced Materials Science and Engineering Laboratory.
It is suggested that political support be provided for scientific research laboratories by issuing policy decisions.
- The administration's fairness and equality of attention. - A call for an increase in the budget and its regulated allocation.
Question 14: Do laboratories have enough material resources?
- Yes, with a percentage of 56%, it is sufficient.
- No: 44%.

Question 15: Based on the distributed questionnaires and survey data, it was determined that a lack of experience among members of research teams is a 100% barrier to scientific knowledge production. However, it does not represent a barrier with a 0% percentage.
However, research laboratories do have the necessary experience, and the real barrier is a lack of coordination among professors and researchers.
So, with a percentage of 78.00%, **the third hypothesis**, which states that there are obstacles preventing research laboratories from producing scientific knowledge, is confirmed.
As a result of the foregoing, **the main hypothesis**, which states that research laboratories play an important role in the production of scientific knowledge, is verified with an 83.50% probability.

1. Scientific research laboratories contribute to the advancement and dissemination of scientific knowledge.

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2. The findings of scientific research contribute to the growth of the university's intellectual capital.

3. Publishing scientific research, particularly in international scientific journals, increases the global recognition and ranking of Abbas Laghrour University and Algerian universities. This includes the number of national and international scientific articles as well as contributions to technological and industrial problem solving.

4. Bringing a fresh perspective to research, particularly at the field and economic levels.

5. Some studies provide researchers with answers to many questions, and some are considered solutions to scientific problems, while others serve as a starting point for further research.

6. Laboratory results are applied, as evidenced by the use of these research findings to improve the university's functional performance.

7. Working to provide the human resources required for specialized research laboratories.

8. The significance of allocating material resources and maintaining good management to support research activities.

9. Focusing on budget allocation and expenditure by relevant authorities in accordance with regulated mechanisms to achieve justice and equality.

10. Orienting state public policy and the higher education sector toward providing material, moral, and human support to research laboratories on a local and national scale.

-Conclusion:

Accompanied by recommendations

Scientific research laboratories are dedicated to producing and disseminating research with the goal of adding to the body of knowledge and elevating collective research to bring about changes and improvements in existing conditions.

Scientific research is regarded as an essential means of achieving academic goals by guiding, supervising, and developing academic staff intellectual capacities. As a result, they can be more effective and influential in the research process, ultimately benefiting the community by meeting its various needs.

Despite their research efforts, the scientific research laboratories at Abbas Laghrour University in Khencela face financial challenges, according to the findings of the

study. Their level of research continues to revolve in a cycle of repetition and scientific consumption, effectively isolating them from society. They should ideally have a strong connection to serve the issues of the community.

Research laboratories must be recognized for their actual contributions to society, scientific research, the economic social sectors, health... and society must recognize the importance of these research laboratories and the research capabilities they provide. These capabilities are critical for addressing community issues, resolving problems, and keeping us up to date on the latest developments aligned with the community's direction.

-The following are the study's recommendations:

1. Increase funding and budget allocations for research laboratories in order to provide the necessary material resources for scientific research.
2. Create a conducive environment for scientific research by establishing legal regulations governing research laboratories.
3. Improve laboratory logistical coordination and lay a solid foundation for scientific research at the university level.
4. Create a clear strategy for promoting scientific research and providing the required human resources.
5. Increase collaboration among research laboratories and interaction among research team members.
6. Reduce bureaucracy and improve material resource distribution.
7. Increase research capabilities by strengthening collaboration with international laboratories and industrial institutions.
8. Set aside funds for the Advanced Materials Science and Engineering Laboratory.
9. Improve collaboration among research professors to increase scientific knowledge production.
10. Improve educational and office space planning.

These recommendations can help to improve the quality of scientific research and increase the contribution of members of research laboratories to scientific knowledge production.

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