

Patents as a Strategic Tool to Boost Algerian Exports Non-hydrocarbon Sector

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Summary: This study aims to analyze the strategic role of patents in supporting and enhancing Algeria's export capacity in non-hydrocarbon sectors, as part of efforts to diversify the national economy and reduce dependence on hydrocarbon revenues. It also seeks to understand the relationship between legally protected innovation and the competitiveness of Algerian products in foreign markets. We relied on an appropriate descriptive and analytical approach to review relevant literature on innovation and non-traditional exports and analyzed various data and statistics to measure the impact of patents on the performance of Algerian exports non-hydrocarbon sector during the period 2017-2023.

The results showed a positive and statistically significant relationship between the number of patents registered locally and internationally and the development of exports non-hydrocarbon sector. It was observed that the most innovative sectors (such as pharmaceuticals, agricultural technology, and some manufacturing industries) have greater opportunities to penetrate foreign markets when reinforced by legal intellectual property protection. The study also confirmed that the absence of a comprehensive national strategy for registering and exploiting patents represents an obstacle to transforming local innovation into a competitive advantage at the international level. The study recommends strengthening the innovation environment and encouraging patent registration among inventors, academic institutions, and small and medium-sized enterprises.

Keywords: Patents; Exports; Strategic; Non-Hydrocarbon; Algeria.

JEL Classification Codes: O31; O34; F14.

I- Introduction :

Faced with rapid changes in the global economy, natural resources alone are no longer sufficient to ensure sustainability and growth. The world is undergoing a profound transformation towards an economy based on knowledge and innovation, where patents are an essential pillar for strengthening the competitiveness of countries, particularly those seeking to free themselves from their dependence on non-renewable resources such as oil and gas. In this perspective, Algeria faces a strategic challenge: reshaping its economic structure by developing exports non-hydrocarbon sector and using intellectual property tools, particularly patents, to stimulate innovation and generate added value.

Leading international experiences have demonstrated that patents not only protect innovations, but also constitute a key driver of research and development and an important facilitator of integration into global markets. By providing legal protection to inventors, these patents enable the transformation of technical knowledge into marketable products and strengthen the ability of businesses, particularly small and medium-sized enterprises (SMEs), to attract investment and enter into international partnerships. This role is becoming increasingly important given the growing competition among developing economies for advanced positions in global value chains.

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Despite the importance of Algeria's scientific and human capital, the contribution of patent-

protected innovation to Algeria's export structure remains limited. International indicators reveal a significant gap between local innovative activity and its ability to transform into exportable products.

The institutional and legislative environment is also characterized by imbalances that prevent the transformation of research ideas into tangible economic gains.

In this perspective, this study aims to analyze the relationship between the patent system and the contribution of Algerian non-hydrocarbon exports, using an approach combining theoretical perspectives and comparative statistical analysis. The study aims to answer the following question:

Can the industrial property regime, particularly patents, play a catalytic role in the upgrading of Algerian non-hydrocarbon exports, and under what institutional and economic conditions can this lever be optimized?

A number of sub-questions arise from this main question, such as:

- How does the patent system in Algeria compare with the standards observed in emerging economies in terms of innovation protection?
- To what extent does inventive activity, measured by patent filings, influence the sectoral structure of Algerian exports?
- What are the institutional, economic and technological obstacles to the effective conversion of patented innovations into goods? high- value exportable added?
- What lessons can Algeria draw from international experiences standards on the integration of patents into competitiveness and export development strategies?

Importance of the study

The importance of this study stems from two integrated levels:

Scientific importance:

This study contributes to filling a knowledge gap in the Algerian economic literature by linking two dimensions often addressed separately: the first, patents as a legal tool for protecting innovation, and the second, the development of exports non-hydrocarbon sector as a strategic issue. The study aims to provide a comprehensive analysis highlighting the economic impact of patents on the structure of exports, thus potentially contributing to research in the fields of innovation economics, international trade and industrial development.

Practical significance

This study is critical for economic decision-makers as it highlights a practical tool that can be used in export support policies. Its findings also provide indicators for understanding the gaps in the national innovation and intellectual property system, which could contribute to the development of a roadmap for reforming the relevant legal and institutional framework. SMEs can benefit from recommendations on how to exploit patents to strengthen their presence in foreign markets.

The transition from a rentier economy to one based on innovation and knowledge requires a restructuring of national priorities and the strengthening of tools such as patents, which enable creativity to be translated into added economic value. In the Algerian context, the use of patents to support a non-hydrocarbon export strategy is no longer an option; it is a necessity imposed by structural challenges and the volatility of global markets. Therefore, this study aims to shed light on this vital link between intellectual property and commercial competitiveness, by analyzing the current situation and proposing future development pathways.

II. Literature Review

Economic literature has witnessed a growing interest in diversifying exports non-hydrocarbon sector in oil-producing countries like Algeria. Reliance on non-hydrocarbon exports is considered a crucial means of mitigating the volatility of global oil prices, enhancing economic sustainability, and reducing dependence on a single source of income. These studies focus on structural challenges such as weak competitiveness, logistical constraints, and regulatory obstacles, alongside strategic opportunities to boost non-hydrocarbon exports through institutional reforms, improved supply chains, and international marketing. They rely on official statistical data and comparative analyses, often employing quantitative methodologies such as regression models, time trend analysis, and sectoral case studies to assess the dynamics of export diversification. The focus is on sectors such as agriculture, manufacturing, and low- to medium-value-added products, which can be analyzed, according to our study, using the dependent variable (exports non-hydrocarbon sector) and the independent variable (patents), as follows:

II.1- Studies Related to Non-Hydrocarbon Exports

Numerous studies emphasize the role of non-hydrocarbon exports in diversifying income through various avenues, but most lack a connection between export diversification and intellectual property as a key driver of innovation. This opens the door to deeper analyses focusing on patents as a strategic tool for enhancing added value non-hydrocarbon products. One such study is Hassiba Almi's "Enhancing Non-Hydrocarbon Exports in Algeria: The Strategic Role of the National Agency for the Promotion of Foreign Trade (ALGEX)" (Almi et al. 2025) analysis of the role of the National Agency for the Promotion of Foreign Trade (ALGEX) in promoting non-hydrocarbon exports during the period 1993–2023. Relying on official export statistics and international comparisons with similar countries, the study revealed that ALGEX's contribution amounted to only 5% of total non-hydrocarbon exports, primarily concentrated on agricultural and light industrial products. This study concluded that a comprehensive national strategy for institutional coordination is necessary, including improving logistics and international marketing, but it overlooked the technological role in building competitiveness.

Abed Adda's study "The Impact of Non-oil Exports on Sustainable Development in Algeria" (Abed 2025) focused on the impact of non-hydrocarbon exports on sustainable development (1990–2022), analyzing economic relationships using regression models and offering policy recommendations. It found a positive correlation between income diversification and innovation in agriculture and industry, with these exports contributing to a 15% reduction in the carbon footprint. However, the study also highlighted regulatory obstacles hindering long-term sustainability.

The study by Mekerkeb-Aberrane "Algerian Export Dynamics: Navigating Global Trends, Challenges, and Strategies" (Mekerkeb and Bahaz 2024) also examined the dynamics of Algerian exports in the face of global trends, using case studies of sectors such as agriculture and manufacturing. It highlighted challenges such as poor quality and Chinese competition, recommending the promotion of innovation through investment in research and development. The results showed a 23% increase in non-hydrocarbon exports in 2024–2025, but with a limited reliance on European markets, emphasizing the need to diversify trade destinations.

In an analytical context, Khelidja Dahmouni's study "The Status of Algerian Exports, Excluding Hydrocarbons" (Dahmouni 2023) assessed the state of Algerian non-hydrocarbon exports for the years 2020–2022, relying on customs statistics and a study of trading partners such as Italy and France. It confirmed a positive trend with annual growth of 12%, driven by food products, but with logistical obstacles and delays in international payments.

Finally, the Export Diversification in Algeria (2015) study used a "products space" methodology to identify diversification opportunities, focusing on high value-added product data such as electronics and chemicals. It identified potential sectors with a 40% success rate, but relied on relatively outdated data, which limits its accuracy in light of current geopolitical changes.

II.2- Studies related to patents and innovation

The literature has highlighted the role of patents as a driver of innovation and competitive advantage, particularly in developing countries, with quantitative analyses linking them to economic growth. For example, Chabi Sabiha "Role of Institutional Determinants in Export Diversification in

Algeria”(Chabi and Touati 2025) estimated the institutional factors for export diversification using political-economic models, confirming that patent protection is essential for innovation, as patents are associated with a 15% increase in exports in developing countries.

Similarly, Brahim Bergougui “Asymmetric impact of patents on green technologies on Algeria's Ecological Future”(Bergougui and Aldawsari 2024) examined the unbalanced impact of green technology patents on Algeria's environmental footprint (1990–2022), using a time-based analysis and economic models such as ARDL. They concluded that patents reduced the environmental impact by 8–12%, but require economic growth to achieve a full positive impact, indicating their role in green diversification.

A study by Özgür Ersin “The nonlinear effects of high technology exports, R&D and patents on economic growth”(ERSİN 2022) analyzed the nonlinear impact of R&D and patents on growth in 35 OECD countries using nonlinear panel models. It concluded that R&D promotes growth even at low levels, with patents contributing 20% to technology transfer.

Finally, Elena Makeeva et al. (2024) examined green energy patents in BRICS countries by analyzing patent trends, demonstrating their support for green growth and corporate performance by 25% through facilitating technology transfer.

II.3- Research Gap Between Previous Studies and Our Current Study

Through our review of previous studies, we identified clear gaps that our study, entitled "Patents as a Strategic Tool to Boost Algerian Exports non- hydrocarbon Sector," can address. These gaps are as follows:

- Hassiba Almi (2025): This study relied on classical analysis in its approach to diversifying non-oil exports, neglecting patents as a competitive tool. Our study, however, considers patents as an effective strategic tool and directly links them to non- hydrocarbon exports.

- Mekerkeb-Aberrane & Bahaz (2024): This study focused on encouraging innovation in the dynamics of Algerian exports in the face of global trends without linking it to strategic patents. Our study, on the other hand, focuses on patents as a strategic tool for boosting Algerian non-hydrocarbon exports.

- Abed Adda (2025): This study explored the role of non- hydrocarbon exports in the sustainable development sector without any reference to patents. Our study, however, focuses on patents as a driver for the development and diversification of non- hydrocarbon exports.

- Khelidja Dahmouni (2023): This study focuses on non- hydrocarbon export trends and innovation mechanisms, while our study examines innovation as a mechanism influencing non-hydrocarbon trends.

- Brahim Bergougui (2024): This study considers patents as a strategic mechanism in the environmental field, while our study focuses on them to enhance the competitiveness of non-hydrocarbon exports.

- Chabi & Touati (2025): This study addresses patents in terms of protection mechanisms without detailing their application to exports. Our study, however, examines them as an effective strategic tool in the field of non- hydrocarbon exports.

- Ersin et al. (2022): This study attempted to link patents and exports in OECD countries, while our study focused on Algeria.

- Elena Makeeva (2024): This study attempted to link patents and exports in BRICS countries, while our study focused on Algeria.

The following table summarizes the gaps we are trying to address in this study.

Table (1) : Summary of gaps

Title	Objective	Methodologic al Tools	Results	Gap
Brahim Bergougui, Med Ibrahim Aldawsari, 2024, Asymmetric	Examining the impact of green technology	Time period analysis (1990-	Patents reduce environmental	It focuses on the environmental

impact of patents on green technologies on Algeria's Ecological Future, Journal of Environmental Management	patents on the environmental footprint in Algeria.	2022) with economic models.	impact but require economic growth.	aspect, not non-hydrocarbon exports, while our study directly links patents to exports.
Hassiba Almi, 2025, Enhancing Non-Hydrocarbon Exports in Algeria: The Strategic Role of the National Agency for the Promotion of Foreign Trade (ALGEX) ,	Analysis of the role of ALGEX in diversifying non-hydrocarbon exports (1993-2023).	Export statistics and international comparisons.	Need for a national strategy for institutional coordination.	It ignores patents as a tool, unlike our study which focuses on them as a competitive driver.
Abed adda ,2025, THE IMPACT OF NON-OIL EXPORTS ON SUSTAINABLE DEVELOPMENT IN ALGERIA: AN EMPIRICAL STUDY DURING THE PERIOD-1990) (2022 , journal of legal and economic research	Exploring the role of non-hydrocarbon exports in sustainable development.	Analysis of economic relations and policy recommendations.	Diversifying income promotes innovation in agriculture and industry.	Generally speaking, without mentioning patents, our study fills this gap by focusing on them as a strategic tool.
Mekerkeb-AberraneTayeb, Bahaz louiza, 2024, Algerian Export Dynamics: Navigating Global Trends, Challenges, and Strategie , Journal of Economic Additions	The dynamism of Algerian exports with a focus on innovation.	Case study and recommendations for diversification.	Investing in research enhances competitiveness.	It encourages innovation but does not link it to patents as in our study.
Export Diversification in Algeria (2015)	Examining export diversification opportunities using product data.	Product space methodology and industrial analysis.	Identifying high-potential sectors.	Not related to patents, our study adds the strategic aspect to patents.
Chabi sabiha, Touati Karima, 2025, Role of Institutional Determinants in Export Diversification in Algeria , Journal of New Economy	Assessing the institutional factors for export diversification.	Political-economic models.	Protecting inventors is essential for innovation.	It touches on protection but does not elaborate on the role of patents in exports as our study does.
Özgür ERSİN, Ayfer USTABAŞ, Tuğçe ACART, 2022, The nonlinear effects of high technology exports, R&D and patents on economic growth: A panel threshold approach to 35 OECD countries , Romanian Journal of Economic Forecasting	Non-linear effect of R&D and patents on growth.	Non-linear panel models.	R&D promotes growth even at low levels.	It deals with developing countries in general, but our study is specialized in Algeria and its non-hydrocarbon exports.
Elena Makeeva, Konstantin Popov and Olga Teplova, 2024, Patenting for profitability: green energy innovations and firm performance in BRICS countries , frontiersin.org	The role of green energy patents in the profitability of BRICS countries.	Patent trend analysis.	Patents support green growth and technology transfer.	It focuses on BRICS, not specifically Algeria or non-hydrocarbon exports.
khelidja Dahmouni, 2023, The Status of Algerian Exports, Excluding Hydrocarbons, for the Years (2020-2022) , International journal of economic performance	Analysis of non-hydrocarbon export trends.	Statistics and business partners.	A positive trend with obstacles.	No patents are mentioned, which makes our study a unique addition.

The source : Prepared by researchers based on previous literature

III. Method and tools

This study adopted a descriptive and analytical approach to explore the relationship between the patent system and the development of Algerian non-hydrocarbon exports. This approach was chosen as the most appropriate for understanding complex economic phenomena involving the

interaction of institutional, legislative, and behavioral elements, which are difficult to subject to direct experimentation.

III.1- Data sources

The study relied on secondary data collected from:

- Reports from the World Intellectual Property Organization(WIPO).
- Reports from the Algerian National Institute of Industrial Property(INAPI).
- Statistics from the Algerian Ministry of Trade and Export Promotion.
- Academic studies and international indicators from the World Bank, the International Monetary Fund and UNCTAD.

III.2- Analysis tools

Quantitative and qualitative analysis tools were used, including:

- Statistical analysis of innovation indicators.
- International comparison with countries like China, India, Kazakhstan.
- Analysis of policies and official documents related to intellectual property and exports.

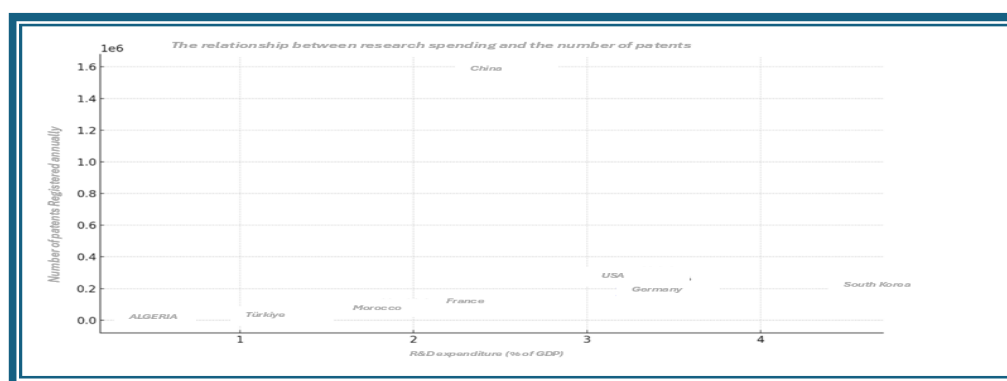
IV. Results and discussion:

IV.1- The relationship between patents and exports non-hydrocarbon sector

1. Patents as an indicator of innovation

Patents are one of the most important quantitative indicators for measuring innovation activity within countries. They reflect the ability of the national innovation system to transform knowledge into concrete economic and commercial applications. Studies show that a high number of patents is closely linked to an increase in investment in research and development, reflecting the dynamism of a knowledge-based economy. A high number of patents is also an indicator of the sophistication of local technologies and their ability to withstand international competition (ALshubiri and Al Ani 2024).However, the use of patents as an indicator requires some caution, as they do not always reflect the real economic value of an innovation. A large number of patents may not be marketable or may not result in a final product. Nevertheless, they remain one of the most important indicators globally and are widely used in international comparisons of countries innovation and technology performance (Archibugi and Planta 1996).

Figure (1): Research and development expenditure



Source : OECD. (2023). Main Science and Technology Indicators. Organisation for Economic Co-operation and Development.

Figure (1) shows the positive relationship between research and development expenditure as a percentage of gross domestic product and the number of patents filed annually. It can be seen that developed countries place great importance on research and development, with most of them exceeding 2% of total GDP, which has enabled them to file a large number of patents, unlike developing countries, whose figure shows that their research and development expenditure does not exceed 1.5% in most cases.

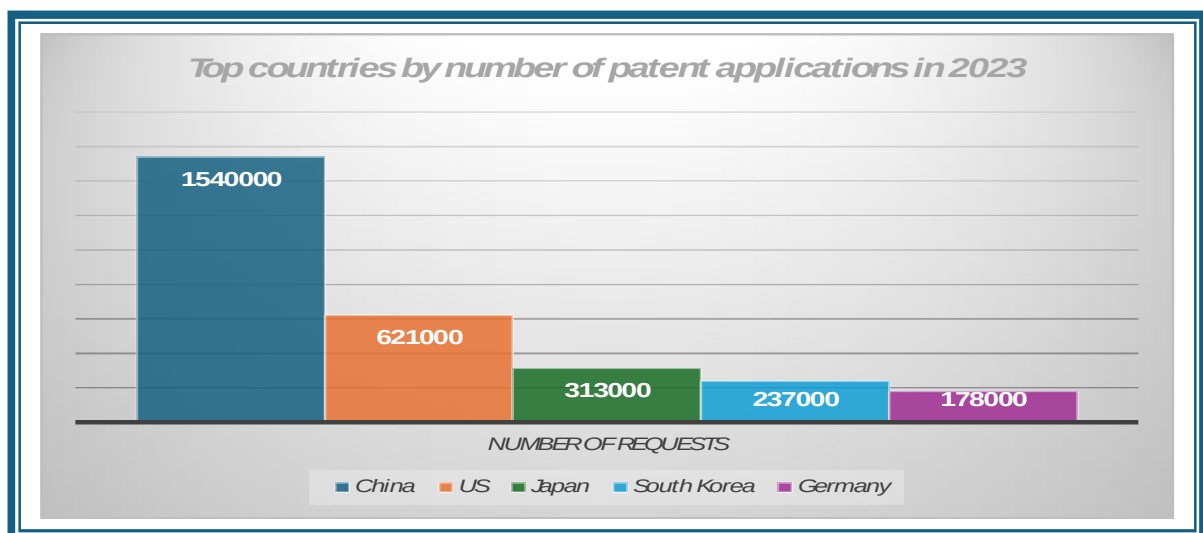
2. The patent as an indicator of global innovation.

According to the Global Innovation Indicators 2023 report published by WIPO, the number of patent applications filed worldwide reached approximately 3.46 million, an increase of 1.7% compared to 2022.

The number of patents is generally linked to the level of investment in research and development (R&D). For example, South Korea spends over 4.8% of its GDP on scientific research (Steve Brachmann, 2024), which explains its relatively high number of patents per capita. International patents, such as those filed under the Patent Cooperation Treaty (PCT), are also considered an indicator of innovation oriented towards global markets.

In 2023, more than 280,000 international patent applications were filed, the majority from large companies such as Huawei, Samsung, and Qualcomm. While patents are an important indicator, they do not always provide a complete picture of innovation, particularly in informal sectors or in countries with limited intellectual property protection systems. Moreover, some innovations, particularly social innovations, are not patented despite their high value. The following figure shows the countries with the highest number of patent applications worldwide in 2023.

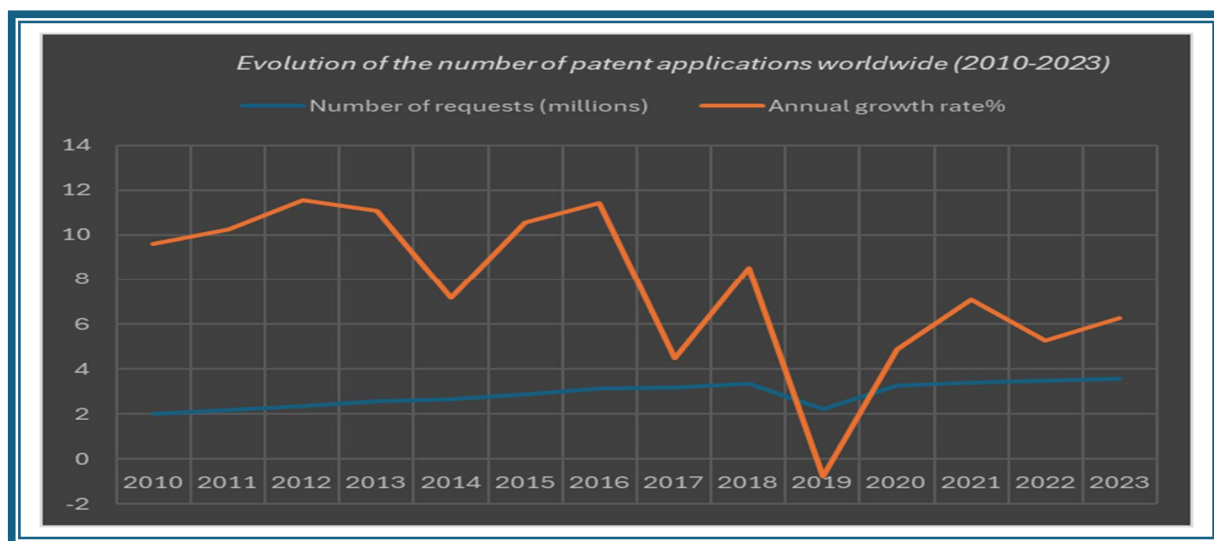
Figure (2): Countries filing the highest number of patents in 2023.



Source : Prepared by the researcher using data from World Intellectual Property Indicators 2024.
<https://www.wipo.int>

Patent applications have grown significantly over the past decade, with some slowdown during the COVID-19 pandemic, as illustrated in the following figure.

Figure(3): Evolution of the number of patent applications worldwide during the period 2010-2023 .



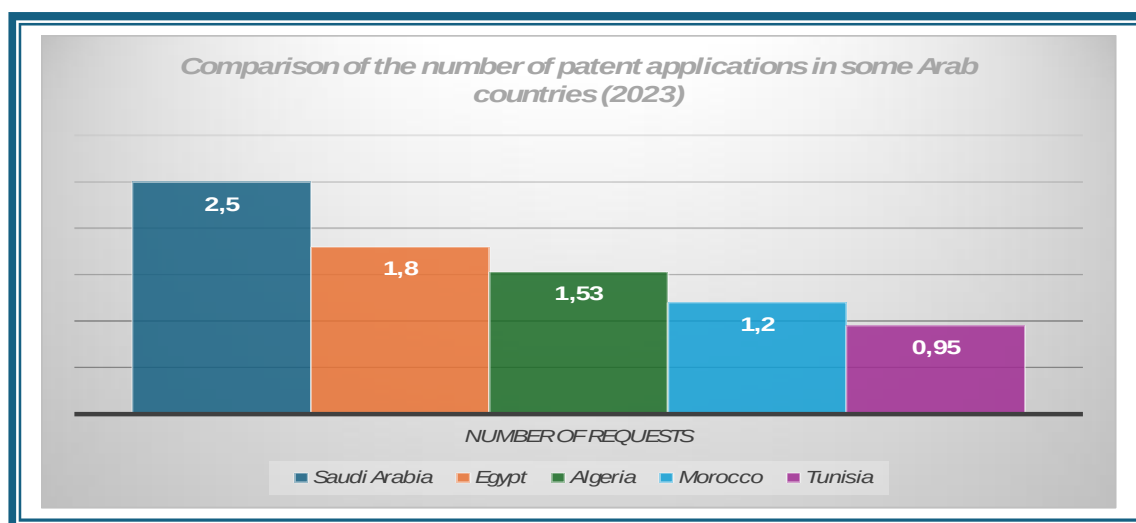
Source: Prepared by the researcher using data from World Intellectual Property Indicators 2024.
<https://www.wipo.int>

The most notable thing that can be observed from the above figure is:

- **Continued growth:** Since 2010, the number of patent applications has increased from approximately 1.99 million to 3.55 million in 2023.
- **Impact of the pandemic:** 2019 saw a 3% drop in the number of applications, the first decline in years due to the impact of the COVID-19 pandemic.
- **Rapid recovery:** After a decline in 2019, growth returned in subsequent years, with consecutive annual increases.
- **China's leading role:** China was the main driver of this growth, recording a significant increase in the number of orders in 2023 compared to 2022.

3. Algeria's position in the field of patents

Available data indicates that Algeria records a limited number of patent applications each year. For example, in 2023, approximately 1,530 patent applications were received, with more than 4,000 innovative projects registered, and an increase of more than 2,000 patent applications registered in six months.

Figure(4): Comparison of the number of patent applications in selected Arab countries(2023)

Source : Prepared by the researcher using data from World Intellectual Property Indicators 2024.
<https://www.wipo.int>

From Figure (4), we note that Saudi Arabia comes in second place, with a notable growth in the number of applications, which demonstrates its efforts to improve the innovation environment. As for Egypt and Algeria, they show average figures with great potential to improve the innovation environment and increase the number of applications by supporting scientific research and developing policies related to intellectual property. As for Tunisia, Qatar, Morocco and Jordan, the figure indicates that they show lower figures, which demonstrates the need to strengthen research and innovation infrastructure.

In order to promote innovation and increase the number of patents, it is necessary to:

- **Improving the research and development environment:** by increasing funding and providing the necessary resources to research centers and universities.
- **Raising awareness of intellectual property:** through training programs and workshops for inventors and researchers.
- **Simplify patent registration procedures:** encourage more individuals and institutions to file patent applications.
- **Encouraging public-private collaboration:** to transform research into marketable products and services.

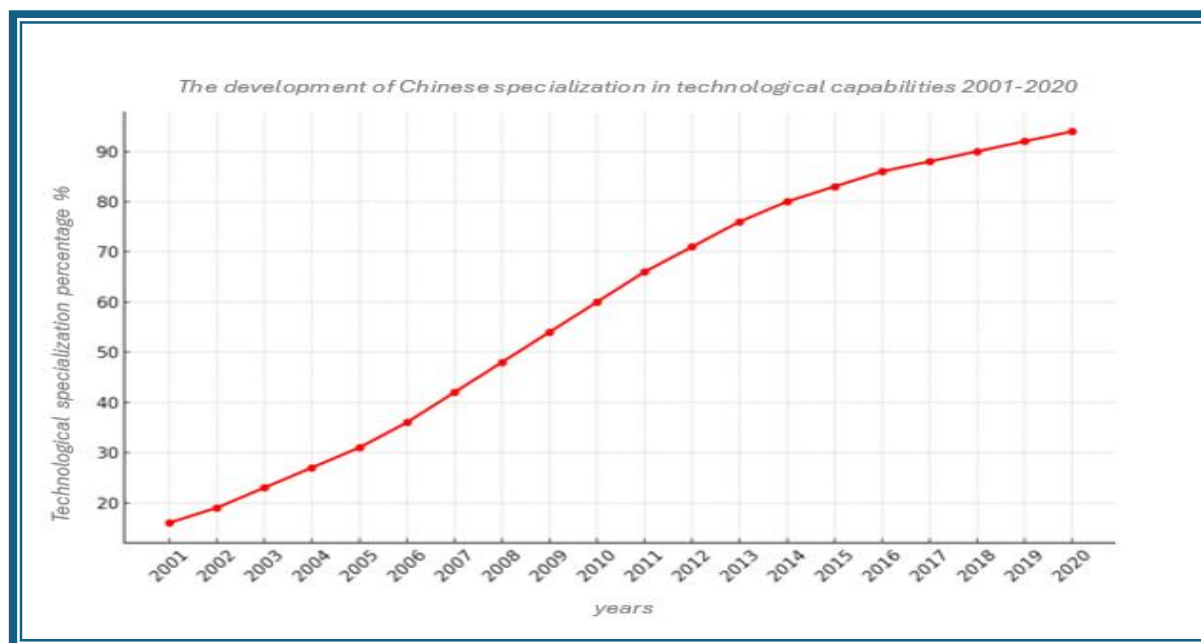
In summary, most data indicate a direct relationship between the number of patents and the level of innovation in countries. While developed countries record a large number of patents, reflecting a dynamic innovation environment, developing countries, including Algeria, must strengthen their research and development policies and improve their innovation environment in order to increase the number of patents and achieve sustainable economic diversification.

IV.2- How do patents affect non-hydrocarbon exports

A global study of 249 sectors and 149 countries over 32 years showed that every 1% increase in the number of patents can lead to an increase in exports of up to 8.87% without impacting the proportion of imports flowing in the opposite direction – an effect comparable to more than half that of free trade agreements (FTAs). (Brunel and Zylkin 2022) China, a success story, increased its technological specialization from 16% to 94% between 2001 and 2020, based on a national policy

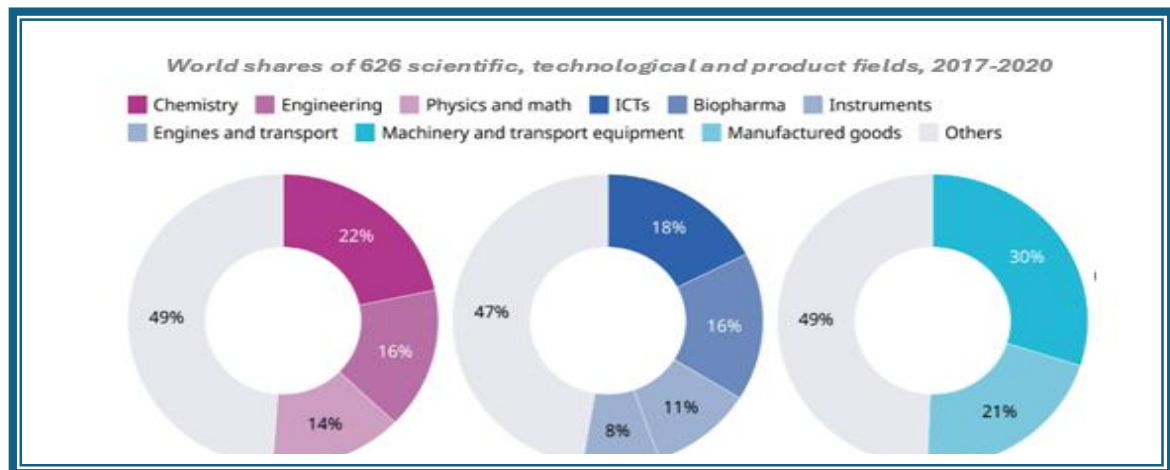
encouraging the filing of patents. This had a positive impact on the diversity of its exports and its progression in global value chains, as illustrated in the following figure:

Figure (5): Evolution of China's specialization in technological capabilities 2001-2020.



Source: Steve Brachmann. (2024). WIPO report highlights importance of patenting to improve technological capabilities. <https://ipwatchdog.com>

From Figure (5), we see that China's percentage of specialization in technological capabilities has grown significantly over the years, from 16% in 2001 to 94% in 2020. These outcomes result from China's significant investments in innovation, research and development, and this has helped to support its technological exports and diversify its economy away from traditional industries.

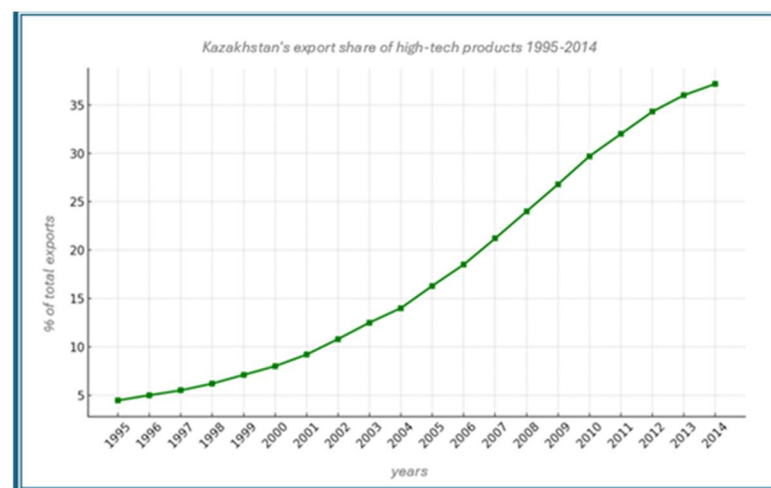
Figure (6): Global shares of science, technology and products 2017-2020.

Source: Steve Brachmann. (2024). WIPO report highlights importance of patenting to improve technological capabilities. <https://ipwatchdog.com>

In general, the countries assessed by the report have experienced Wipo its scientific, technological, and production capabilities increased by 5% between 2001-2004 and 2017-2020. China, in particular, saw a significant increase in its technological capabilities, largely driven by its booming patenting activity. From 2001 to 2004, China accounted for only 16% of all technological capabilities, although this figure increased to 94% of capabilities during the study period of 2017 to 2020.

Other countries that experienced significant increases in capabilities included the Republic of Korea, which saw its science and technology capabilities increase from 40% to 66% and 83%, respectively; and India, which saw its science specialization increase from 42% to 68% and its technology specialization increase from 9% to 21%. While Germany and Japan enjoyed a higher degree of capability specialization during the first study period, both countries experienced declines in all three sectors in 2020.

One of the most interesting countries is Kazakhstan, which has been developing an investment strategy in innovation and technology since the 1990s, aimed at diversifying its exports from traditional products to high-tech products, with the share of the latter increasing from 4.46% in 1995 to over 37% in 2014 (World Bank 2023). The following graph illustrates this phenomenon:

Figure (7): Exports of high-quality products from Kazakhstan during the period 1995-2014.

Source: World Bank. (2023). Kazakhstan Economic Update. <https://www.worldbank.org>

Figure (7) shows that the share of Kazakhstan's high-tech exports increased significantly between 1995 and 2014, from about 4.46% to 37.17%. This result demonstrates the success of Kazakhstan's innovation and industrial transformation policies to support economic diversification and reduce its dependence on primary resources.

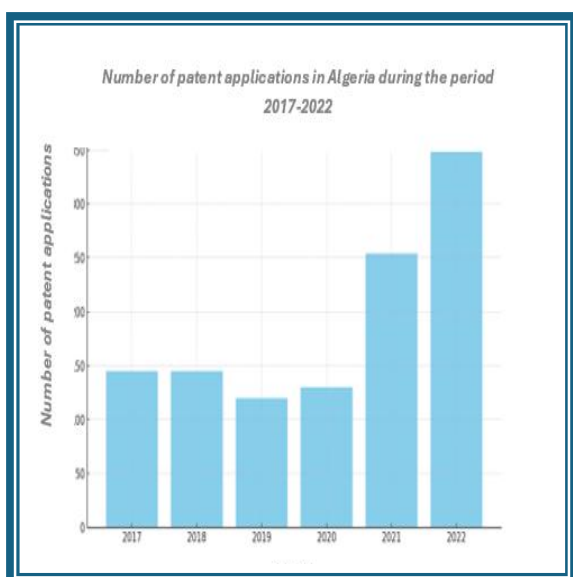
Therefore, patents not only protect inventions against theft or imitation, but also function as an integrated system to improve the quality of the products themselves, which leads to their local success, especially in the face of competition in international markets, as they function to:

- **Improving international competitiveness:** Because patented products are often unique or technologically advanced, they are more competitive in international markets. This paves the way for the export of advanced industrial and technological products, such as pharmaceuticals, medical equipment, agricultural technologies, software and machinery.
- **Stimulating investment in non-traditional sectors:** An effective intellectual property protection system encourages the private sector to invest in innovation, which promotes the development of alternative sectors to hydrocarbons or even traditional non-technological products.
- **Attracting foreign partnerships:** Countries with high patent rates attract the interest of multinational companies, which generally hold advanced technologies, to manufacture their products locally or collaborate with local innovators.
- **Converting knowledge into exportable economic value:** by licensing or selling patented technologies to foreign companies.

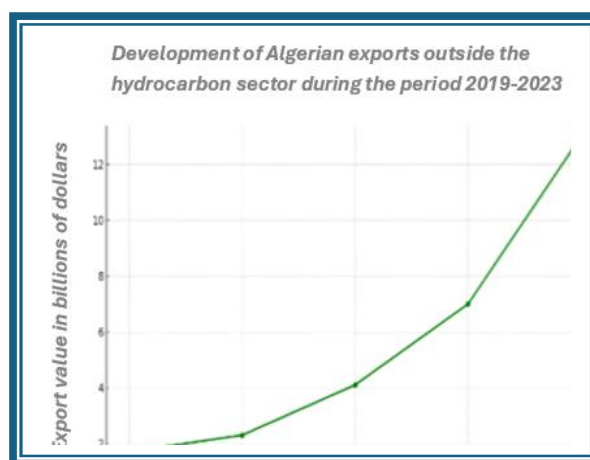
IV.3- The impact of patents on improving Algerian exports non-hydrocarbon sector

In recent years, Algeria has sought to diversify its economy and reduce its dependence on hydrocarbon exports by boosting exports in other sectors such as industry, agriculture, and services. In this context, patents play a vital role in fostering innovation and increasing the competitiveness of Algerian products in international markets. Algeria has recorded significant growth in its exports non-hydrocarbon sector, while adopting a strategy of focusing on emerging companies to transform the characteristics of the national economy. The number of patent applications has increased significantly, as the following figures show.

Figure(8)



Figure(9)



Source : Ministry of Trade and Export Promotion. (2023). Non-hydrocarbon export statistics. <https://www.commerce.gov.dz/> (Written in French)

The data presented in Figure (8) indicate that Algerian exports non-hydrocarbon sector are experiencing a significant upward trend, with their value increasing from approximately \$1.7 billion in 2019 to nearly \$7 billion in 2022, with forecasts to reach \$13 billion by 2025. (APS 2023) These exports include various products such as fertilizers, iron and steel, construction materials, in addition to agricultural products such as dates. This partial improvement is attributed to the state's attempts to diversify the production base and encourage value-added sectors.

In this context, patents appear as one of the main drivers promoting this trend, as they reflect the capacity of national institutions in terms of technical and cognitive innovation. Innovative products protected by law represent a strategic lever for improving product quality and developing competitive advantages allowing access to new markets. Innovations supported by patents can contribute to increasing the added value of Algerian exports, particularly in light of growing global competition. This makes investment in research and development and patent registration one of the fundamental conditions for achieving a qualitative leap in exports non-hydrocarbon sector. Examining the data in Figure (9), we see that there has been a significant increase in the number of patent applications in recent years, particularly in 2021 and 2022, indicating a growing interest in innovation and intellectual property protection. This upward trend reflects growing efforts to promote a culture of innovation and scientific research in Algeria.

Despite these impressive figures, transforming these innovations into exportable products remains a challenge, requiring additional support from both government and the private sector. Indeed, the growth in export volumes is not attributable to the growth in the number of patent

Source Algerian National Institute of Industrial Property (INAPI). (2023). Annual report of patent applications in Algeria 2017-2022. <https://www.inapi.org.dz/> (Written in French)

applications, as most exports consist of fertilizers, iron and steel, construction materials, and some agricultural products.

IV.4-Challenges facing Algeria in the field of patents Weak culture of innovation

Algeria suffers from a marked weakness in its innovation culture, as evidenced by its low patent filing rate compared to other African countries. A report by the World Intellectual Property Organization indicates that Algeria registers approximately 0.5 patents per million inhabitants, compared to 35 in Tunisia and 150 in South Africa (WIPO 2023), reflecting a significant gap in national innovation activity. This is compounded by the lack of academic awareness among researchers. A study by the Algerian Ministry of Higher Education showed that approximately 70% of university researchers lack sufficient knowledge of patent registration mechanisms, which hinders the transformation of research ideas into protected intellectual property. Furthermore, the National Institute of Statistics reveals that approximately 85% of Algerian companies do not hold any patents, which indicates the weak integration of innovation within the local industrial sector.

There are several main reasons for this phenomenon, including weak curricula that do not adequately address intellectual property in university courses. As a result, students and researchers lack the skills needed to understand and apply this essential field. Furthermore, the lack of financial or academic incentives, such as awards and promotions for inventors within universities, reduces researchers' motivation to file patents or develop innovative projects.

Therefore, it is proposed to take practical measures to promote the culture of innovation in Algeria, including the inclusion of specialized training courses in the field of intellectual property in university curricula, which would contribute to raising awareness among students and researchers about the importance of protecting their intellectual rights (EL AMRANI 2021). It is also recommended to launch awareness campaigns aimed at entrepreneurs through various media, taking advantage of the experiences of initiatives such as the "Ibdaa" initiative in Egypt, which aims to stimulate creativity and support innovation in the private sector (Sarabdeen and Mohamed Ishak 2024).

1. Lack of funding

Lack of funding is one of the fundamental challenges hindering the development of the innovation system in Algeria, both at the research and industrial levels. Statistics indicate that the research and development budget in Algeria does not exceed 0.7% of GDP, a low percentage compared to neighboring countries such as Morocco, which devotes 1.5%, or Turkey, which devotes 2.2% of its GD (UNCTAD 2023). This low percentage directly translates into low funding for research and innovation projects. An official report by the Algerian Scientific Research Support Fund revealed that approximately 90% of innovation funding applications is rejected due to a lack of available resources (Financial Market Regulatory Authority 2023).

This situation is partly attributed to the rentier structure of the national economy, where more than 94% of state revenues depend on hydrocarbon exports. This weakens Algeria's ability to diversify its investments and allocate stable resources to innovation and scientific research (IMF 2023). The lack of effective private sector participation also increases the fragility of innovation financing, as companies do not contribute more than 5% of total R&D investments, reflecting the weakness of incentives and legislation that encourage companies to engage in innovation dynamics (World Bank 2023).

In this context, it is essential to develop new and more effective financing mechanisms, such as the creation of a national fund dedicated to supporting innovation, inspired by the Saudi Innovation Fund, which was launched with an estimated budget of \$2.8 billion and is considered one of the most successful initiatives in the Arab region in terms of stimulating investment in technology and research projects (SIF 2023). Cooperation can also be strengthened with international financial institutions, such as the African Development Bank, which provides dedicated financing channels to support technology projects in African countries through flexible financing programs aimed at supporting sustainability and innovation (African development bank, 2023).

V - Conclusion:

It is clear from the above that patents are no longer just a legal mechanism for protecting the rights of innovators. Rather, they have become a strategic lever for economic development and an effective means of stimulating value-added exports, particularly in economic contexts seeking to break with historical dependence on natural resources. The transition to a diversified economy non-hydrocarbon sector, as is the case in Algeria, inevitably requires investments in knowledge and the valorization of the results of scientific research and technological innovation. This cannot be achieved without an effective system of patent protection and exploitation.

It has also become clear that the relationship between the patent system and exports is neither automatic nor systematic, but rather depends on the existence of a stimulating institutional and legislative environment, as well as the level of awareness among economic actors about the feasibility of using intellectual property rights in their business strategies. Therefore, strengthening this relationship requires a set of integrated policies including: reforming the legal framework, supporting a culture of innovation, strengthening links between universities and institutions and establishing incentives for technology exports.

In light of the above, analyzing the relationship between patents and the promotion of exports non-hydrocarbon sector is not an academic luxury. Rather, it constitutes a necessary contribution to understanding the dynamics of the transition to a more open and efficient economic model. This requires intensifying theoretical and field research on this axis, and keeping pace with global transformations in the fields of innovation and trade.

Proposed solutions:

For Algeria to achieve its objective and promote its high-tech exports, it must work on:

- Activation of government support tools to boost non-hydrocarbon exports, by offering various financial and customs facilities to exporters. This support includes a contribution to covering international transport costs and participation in international trade fairs, in order to enable domestic products to access foreign markets in a more competitive manner;

- Encouraging companies to invest in research and development, as this is considered a fundamental mechanism for enhancing the added value of Algerian products, as obtaining patents helps to differentiate products and facilitate their access to markets with high technical requirements;
- Activation of the strategy aimed at strengthening national innovation through international cooperation, considered one of its fundamental pillars, particularly through partnerships with international research centers, which contribute to the transfer of technology and expertise;
- Support local capacity building in advanced technical areas;
- Launch national awareness campaigns that highlight the importance of protecting intellectual property and linking it to the export capacity of institutions, particularly in high-potential sectors such as the food and pharmaceutical industries;
- Simplifying patent registration procedures is a necessary step to encourage individuals and institutions to protect their innovations. The legislative and procedural environment plays a key role in accelerating or limiting the pace of local innovation;
- Allocating increased financial resources to research and development in export-oriented sectors is a top priority. International experience shows that every 1% increase in research funding leads to a tangible improvement in a country's trade balance.

Recommendations

- Increase the research and development budget to more than 1.5% of GDP;
 - Simplify patent registration procedures through digital transformation and reduce costs;
 - Include the issue of intellectual property in university curricula;
 - Strengthening the link between universities and the industrial world through partnership incentives;
 - Launch of a national innovation support fund, inspired by successful regional models;
 - Encourage startups to use patents as a project financing tool;
 - Support international cooperation in the field of innovation and technology transfer.
- **References:**

- Abed, adda. 2025. 'THE IMPACT OF NON-OIL EXPORTS ON SUSTAINABLE DEVELOPMENT IN ALGERIA: AN EMPIRICAL STUDY DURING THE PERIOD (1990-2022)'. *Journal of Legal and Economic Research* 8(1):1001–26.
- African development bank,. 2023. *Innovation for Development Financing Strategies in Africa*., https://www.afdb.org/sites/default/files/2024/05/16/umdf_annual_report_2023_en.pdf.
- Almi, Hassiba, Khayreddine Bouzerb, Aboubaker Khoualed, Raed Awashreh, and Zakaria Hamza. 2025. 'Strategic Role of the National Agency for the Promotion of Foreign Trade (ALGEX)'. *Annals of Dunarea de Jos University of Galati. Fascicle I. Economics and Applied Informatics* 31(1):78–90. doi:10.35219/eai15840409488.
- ALshubiri, Faris, and Mawih Kareem Al Ani. 2024. 'Do Intellectual Property Rights Promote Foreign Direct Investment Inflows and Technological Exports in Developing and Developed Countries?' *Foresight* 26(2):272–99. doi:10.1108/FS-05-2023-0096.
- APS. 2023. *Algeria Records a Leap in Non-Hydrocarbon Exports and Is Confidently Moving towards Diversifying Its Economy*. <https://www.aps.dz/en/economy/48040-non-hydrocarbon-exports-quantitative-increase-diversification-since-2020#:~:text=ALGIERS%2DAlgeria's%20non%2Dhydrocarbon%20exports,evolution%20in%20value%20and%20volume%2C>.
- Archibugi, Daniele, and Mario Planta. 1996. 'Measuring Technological Change through Patents and Innovation Surveys'. *Technovation* 16(9):451–519. doi:10.1016/0166-4972(96)00031-4.

- Bergougui, Brahim, and Mohammed Ibrahim Aldawsari. 2024. 'Asymmetric Impact of Patents on Green Technologies on Algeria's Ecological Future'. *Journal of Environmental Management* 355:120426. doi:10.1016/j.jenvman.2024.120426.
- Brunel, Claire, and Thomas Zylkin. 2022. 'Do Cross-border Patents Promote Trade?' *Canadian Journal of Economics/Revue Canadienne d'économie* 55(1):379–418. doi:10.1111/caje.12577.
- Chabi, sabiha, and Karima Touati. 2025. 'Role of Institutional Determinants in Export Diversification in Algeria'. *Journal of New Economy* 16(2):363–78.
- Dahmouni, Khelidja. 2023. 'The Status Of Algerian Exports, Excluding Hydrocarbons, For The Years "2020-2022"'. *International Journal of Economic Performance* 86. doi:10.54241/2065-006-002-005.
- EL AMRANI, M. 2021. 'Les Projets Agro-Écologiques et Biologiques Périurbains Portés Par La Diaspora et Les Marocains(Es) de Retour Au Maroc, Les Transitions Ecologiques.' Gabon.
- ERSİN, Özgür. 2022. 'THE NONLINEAR EFFECTS OF HIGH TECHNOLOGY EXPORTS, R&D AND PATENTS ON ECONOMIC GROWTH: A PANEL THRESHOLD APPROACH TO 35 OECD COUNTRIES'. *Romanian Journal of Economic Forecasting* 27(1):1–19.
- Financial Market Regulatory Authority. 2023. *ANNUAL SECURITIES MARKET ACTIVITY REPORT Year 2023*. Algeria. <https://cosob.dz/wp-content/uploads/2024/10/rapport-annuel-2023-V-FR.pdf>.
- IMF. 2023. *Algeria: Fiscal Outlook and Energy Dependence*. Washington, DC: International Monetary Fund. <http://www.imf.org/en/publications/WEO>.
- Mekerkeb, AberraneTayeb, and louiza Bahaz. 2024. 'Algerian Export Dynamics: Navigating Global Trends, Challenges, and Strategies'. *Journal of Economic Additions* 8(1):638–55.
- Sarabdeen, Jawahitha, and Mohamed Mazahir Mohamed Ishak. 2024. 'Intellectual Property Law Protection for Energy-Efficient Innovation in Saudi Arabia'. *Heliyon* 10(9):e29980. <http://doi:10.1016/j.heliyon.2024.e29980>.
- SIF. 2023. *Strategic Innovation Financing: The Saudi Model*. KAUST Innovation. <https://innovation.kaust.edu.sa>.
- Steve Brachmann •. 2024. *WIPO Report Highlights Importance of Patenting to Improve Technological Capabilities*. <https://ipwatchdog.com/2024/05/06/wipo-report-highlights-importance-patenting-improve-tech-capabilities/id=176213/>.
- UNCTAD. 2023. *Harnessing Intellectual Property Rights for Innovation, Development and Economic Transformation in Least Developed Countries*. https://unctad.org/system/files/official-document/comsec2024d1_en.pdf.
- WIPO. 2023. *World Intellectual Property Indicators 2023*. World Intellectual Property Organization. <https://www.wipo.int/publications/en/details.jsp?id=4523>. World Bank. 2023. *Kazakhstan Economic Update*. <https://www.worldbank.org>.