The inevitability of adopting an ecosystem of intelligence by local economic institutions as a mechanism to establish a circular economy in Algeria.

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Abstract:

This research paper aims to study the role of the ecological intelligence within local economic institutions in Algeria, with the aim of promoting the circular economy model. This initiative comes as a result of growing concerns about the environmental impacts of the modern global economic system, which has prompted the international community to intensify efforts to encourage countries, especially developing ones, to simplify their production processes to preserve natural resources and promote sustainable growth. It also highlights the challenges faced by Algerian institutions in adopting ecological responsibility strategies, which hinders their ability to develop the circular economy model as needed.

This study reached an important conclusion that "Ilef Bio" succeeded in applying the principles of ecological intelligence, which allowed it to evaluate its prickly pear products and recycle them as green products that enhance Algerian efforts towards a circular economy.

Keywords: Ecological intelligence; ecological vigilance; ecological production; circular economy.

JEL Classification Codes: O44, Q51, Q57, M10

ملخص:

تهدف هذه الورقة البحثية إلى دراسة دور الذكاء البيئي داخل المؤسسات الاقتصادية المحلية في الجزائر، بهدف تعزيز نموذج الاقتصاد الدائري. وتأتي هذه المبادرة نتيجة للمخاوف المتزايدة بشأن الآثار البيئية للنظام الاقتصادي العالمي، الأمر الذي دفع المجتمع الدولي إلى تكثيف الجهود لتشجيع النامية على تبسيط عملياتها الإنتاجية للحفاظ على الموارد الطبيعية وتعزيز النمو المستدام. ولعل الجزائر من الدول التي أخذت المبادرة لبعث مؤسسات تسري ضمن توجه الاقتصاد الدائري.

وتوصلت هذه الدراسة إلى نتيجة مهمة مفادها أن "إيلاف بيو" نجحت في تطبيق مبادئ الذكاء الإيكولوجي، مما سمح لها بتثمين منتجاتها من التين الشوكي وإعادة تدويرها كمنتجات خضراء تعزز الجهود الجزائرية نحو اقتصاد دائري.

كلمات مفتاحية: الذكاء الإيكولوجي.، اليقظة الإيكولوجية.، الإنتاج الإيكولوجي.، الاقتصاد الدائري.

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1. Introduction

During the last two decades of the twentieth century, the world witnessed many transformations and changes in the economic, political, social and cultural fields. The cognitive revolution and technological developments played a major role in influencing the nature of international economic relations, which became largely dependent on the principles of liberalism and the rules of the market economy. This has led to increased international competition in a more regulated framework under the dominance of international organizations that oblige countries to take care of and conserve available resources, in application of sustainability principles. In response to this endeavor, many countries have sought to shift from a linear economy that wastes wealth to a circular economy that creates wealth. Attention to the environmental aspect is considered one of the basic axes of the circular economy in the context of achieving sustainable development. Influential international organizations stress not to transform the global economy into an environmentally harmful economy, and oblige countries to create economic institutions and productive sectors capable of dealing with environmental issues. This reflects a deep understanding of environmental responsibility, which requires avoiding encroachment on the environment, not wasting resources, and protecting the wealth of future generations.

Ecological intelligence is one of the basic systems that provide economic institutions with environmental awareness and the ability to adapt to biological conditions. This is evident in the exploitation of available resources in a way that achieves strategic objectives without affecting social values or violating the ecological heritage, which enhances sustainability and competitive superiority. Today's organizations face challenges in entering international markets due to environmental quality requirements, although trade contracts exist to enhance flows between countries. International meetings such as the Climate Summit and the Earth Summit support this trend, making the move towards a circular economy urgent. Economic institutions contribute significantly to enhancing this trend by improving their management strategies and adopting environmentally smart systems.

Although Algeria seeks to improve its geo-strategic position by signing several trade agreements and economic treaties to strengthen its national economy, its non-oil products continue to suffer from marginalization in international markets. This is because Algerian economic institutions were unable to adhere to environmental quality standards and obtain the required environmental standard. These circumstances prompted Algeria to take serious steps to create a more effective institutional fabric, by opening the way for the private sector and granting financial and technical privileges to improve its performance. The development programs that began at the beginning of the third millennium reflect Algeria’s efforts to build a production base that adheres to environmental responsibility and seeks to achieve a

circular economy to ensure sustainable and balanced development among members of society. Perhaps the "Ilef Bio" Foundation is a model that turned towards this endeavor in order to value its prickly pear products and make it a green product that ensures achieving Principles of moving towards a true circular economy, and from this standpoint we can pose the problem of our research as follows:

How can adopting the Ecological intelligence in local economic institutions contribute to strengthening the circular economy in Algeria?

Within the framework of the proper progression to answer the study's problem, we will seek to test the validity of the following hypotheses.

- The accelerated dynamism in the environment surrounding the activity of economic institutions may contribute to the emergence of modern management patterns, such as the economic intelligence system, which allows institutions to recognize the opportunities and threats surrounding them.
- The shift from a linear economic pattern that squanders wealth to a circular economic pattern has become an urgent priority for countries now, in light of the technological, economic, and behavioral transformations that the world witnessed at the end of the last century.
- The ability of organizations to adapt to the environmental conditions surrounding their commercial and production activities is one of the basic factors that contribute to facilitating their transition to a circular economy.
- Algeria, along with local economic institutions, seeks to enhance environmental responsibility in light of the international circumstances that have negatively affected their productive sectors and made them suffer from marginalization.

This study seeks to address an important problem related to reviewing the importance of ecological intelligence in local economic institutions in Algeria and its importance in establishing the circular economy, as Algeria is considered one of the countries that strives to adopt the concept of the circular economy as a means of achieving sustainable development. In this context, ecological intelligence plays a role Pivotal in enhancing the endeavors of economic institutions towards achieving this goal, ecological intelligence provides these institutions with a deeper understanding of the relationship between their economic activities and the surrounding environment, which enables them to make informed decisions that preserve natural resources and reduce waste. In addition, it contributes to enhancing environmental innovation, new technologies and solutions can be developed that enhance the efficiency of using resources and recycle products in effective ways. In this way, Algeria can achieve a more sustainable economy that balances economic growth with environmental preservation, which benefits current and future generations alike.

2. Conceptual Framework of Ecological Intelligence

Rapid economic and social changes, along with shifts in power dynamics, have complicated business management within economic institutions. Decision-makers now face difficulties in making timely and appropriate decisions to achieve strategic objectives, which has increased the demand for information. With the shortening product life cycles, accelerated technological advancements, and intensified global market competition, information has become a critical production factor alongside labor and capital. Consequently, institutions have been compelled to adopt economic intelligence systems to adapt to their internal and external environments, enhancing their competitiveness in marketing, technological, and ecological domains. Institutions struggle to provide environmentally friendly products, impacting their image with consumers and international regulatory bodies. Therefore, adopting ecological intelligence systems is crucial for improving competitive strength and achieving sustainability through the adoption of a circular economy, which ensures efficient resource utilization without waste.

2.1 The concept of economic intelligence

The term economic intelligence is considered one of the terms that accompanied the emergence of the knowledge economy. We can also define it as the system that allows analyzing and examining the organization’s environment by collecting and analyzing data and disseminating useful and appropriate information to the decision maker in order to make appropriate decisions that Serves the organization's strategic vision (Bruno & Yves-, 1995, p. 12).

Therefore, economic intelligence, in other words, represents the system that is concerned with everything that happens and does in the markets. It is also considered a complete system in which techniques and human capabilities are united. It allows obtaining the correct information at the right time to make the appropriate decision. It also allows the process at the organization level to be Attentive to all surrounding circumstances, economically, politically, culturally, technologically and even ecologically.

Economic intelligence as a management style within an economic institution is divided into several types. Management thought has separated competitive intelligence as a system that supports competitive advantage for the institution, marketing intelligence as a system that improves marketing skills at the level of target markets, and technological intelligence as an important way out of adapting to modern cognitive and digital systems and gaining The institution is a new competitive advantage that inevitably affects production skills and arts, emotional intelligence as a system for managing and developing human capabilities at the institution level, and finally the ecological intelligence system as a mechanism based on ecological vigilance that allows the institution’s activity to be made more

responsible in terms of preserving the environment and biological systems.

2.2 The concept of ecological intelligence

It is considered one of the most important types of economic intelligence, and it also represents one of the important management systems within the economic institution that allows the processing and examination of data related to the institution's environment in the ecological aspect. This is defined by the European Environment Agency (AEE) as a system Comprehensive, allowing the exploitation of all technological techniques, material means, and even human means in order to collect and collect a huge amount of huge data, whether structured or non-structural, in order to process it through appropriate and effective digital rules in order to broadcast the correct and useful information to its user to make the right decisions that are in line with the developments presented, In the international ecological arena (AOUDE, 2008, p. 61).

The ecological intelligence system depends on a number of important means that open the way for the economic institution to adapt to the environmental conditions surrounding it and try to make these conditions consistent with the strategic objectives of the institution. Accordingly, we will try to present the most important means that the institution must take into account in order to be able to say that it is an ecologically intelligent institution.

2.2.1 The importance of economic institutions adopting ecological intelligence

Economic institutions in the modern era face multiple challenges related to environmental sustainability and efficient use of resources. In this context, adopting ecological intelligence is a strategic goal that seeks to achieve a balance between economic growth and environmental preservation. Ecological intelligence aims to enable organizations to develop policies and strategies characterized by environmental awareness. Accordingly, the importance of organizations adopting ecological intelligence can be reviewed in the following points:

- Supporting the competitive position of the economic institution within the industrial environment on the basis that it contributes to the involvement of the least expensive production elements (clean energies) and the most effective for productive activity (cleaner production) (M. & Bouley, 2012, p. 27).
- Improving the image of the economic institution in the minds of consumers, whether they are potential or potential, especially in light of the maturity of consumer and cultural behaviors of individuals in society, so that the consumer now prefers to purchase the products of companies that are committed to environmental responsibility and that respect the ecological aspect.
- Enabling the organization to achieve its strategic vision, especially since the modern global trend requires not oxidizing the economy and moving towards circular economic patterns based on cleaner and more renewable production

factors (Boudjema, 2008, p. 105).

- Ecological intelligence has become an international endeavor more than an institutional one. Today, countries are interested in this system as a structural policy that opens up multiple opportunities for them to employ all the relative advantages available to them that rise to the level of efficiency and effectiveness.

2.2.2 The Fundamental Pillars for Activating Ecological Intelligence in Economic Institutions

Ecological intelligence is based on three basic pillars that enable it, as a system, to collect and analyze huge data surrounding the activity of institutions or countries. These elements are also important and may make it an effective system that ensures response to various phenomena and factors.

a- **Competitiveness policy**: Continuous monitoring of the performance of economic institutions or the general performance of countries at the global level is a major source for gaining important lessons and conclusions related to the periodic activity of concerned parties. This monitoring makes it possible to discover opportunities and challenges surrounding the activity, and enhances the ability of the institution or country to detect strengths and weaknesses in its performance. Hence, attention to analyzing the surrounding environment is crucial to activating ecological intelligence and achieving a sustainable competitive advantage.

b- **Economic security policy**: The success of economic institutions and countries in activating the ecosystem of ecological intelligence and making it capable of achieving strategic goals is based primarily on high-level security systems capable of ensuring the protection of the knowledge heritage generated from the use of information resulting from the process of processing and good analysis of big data.

c- **Influence policy**: Economic institutions that adopt the ecosystem of ecological intelligence seek to exploit the factors surrounding them related to the ecological aspect to achieve their strategic goals. Unlike traditional management methods that focus on managing available resources and adapting to surrounding changes to achieve goals, an intelligence ecosystem allows organizations to interact more effectively with the global economic environment. By engaging in economic blocs and joining influential organizations, organizations can channel the circumstances around them to strengthen their strategies and achieve greater influence in the global economic landscape (Clerc, 1998, p. 334).

2.2.3 Ecological Intelligence Tools

The effectiveness of an organization's ecosystem requires the availability of a set of basic tools that define the organization as ecologically intelligent. These tools include specific techniques and strategies that contribute to improved environmental performance and effective resource management. Below, we will review these tools in detail, explaining the role of each in enhancing the organization's ecological

intelligence.

a- **Ecological vigilance**: Strategic vigilance is considered one of the most important basic tools on which the economic intelligence system is based. It represents the appropriate mechanism for examining and analyzing the organization's environment and trying to understand all the circumstances surrounding its activity. Vigilance may be based on the process of collecting and analyzing data related to the organization's environment and trying to sort classify and store it on a basic level. Huge information in order to open the way for the decision maker within the organization to use useful and appropriate information in this regard. Therefore, ecological intelligence may be based on the process of ecological vigilance within the organization, which can be defined as the process of collecting and collecting data related to the organization's ecological environment and the possibility of processing, classifying and storing it at the level of very technical systems. It is effective and allows it to be protected and broadcast to the decision maker within the organization so that his decision is free of uncertainty and so that he is able to correct deviations in performance, especially in the aspect related to environmental responsibility (SAHNOUN & Belhadia, 2007, p. 23).

b- **Ecological production**: The interest of the economic institution in making environmental investments that are more ecologically responsible has become a major challenge that stands as a concern regarding the continuity of its activity and the competitiveness of its performance within the industrial environment, and when talking about ecological industries or what is known as cleaner production, this means in fact talking about optimal use. For the resources available to the organization while reducing environmental stress (Daniel, 2010, p. 112), although there is no great consensus to provide a comprehensive definition of ecological production, it can be said that ecological production may represent all processes of exploiting raw materials within production chains that meet the conditions of environmental protection procedures. It can also be said that it is the sum of processes Related to the design and implementation of the production of products that meet the need and satisfy the desire of the target and potential consumers and which ensure that the environmental aspect of the general environment of the institution is not compromised, that is, in more profound terms, that these production activities are careful not to pollute the climate and the dry ocean, reduce violations and solid waste and recycle them, rationalize consumption. Especially depleted water and energy, combating environmental stress phenomena, global warming, melting of the Arctic ice and other related phenomena.

c- **Green organizational culture**: In view of the critical environmental dilemmas that human life faces, such as rising global temperatures, rising ocean levels, and depleting depleted energy sources, environmental management practices within

institutions have become more than inevitable, as recent studies indicate that effective integration of environmental management It requires an organizational culture that supports the environment, with the availability of workers who are aware of environmentally appropriate operations. Therefore, the basic condition supporting the continuity of the economic practice of these institutions has become based on instilling greener and socially responsible organizational cultures. To move towards a green organizational culture, institutions must:

- Integrates environmental considerations throughout the organization.
- Consider such concerns at all stages of the value chain.
- Reduce its focus on economic goals.
- Developing a strategic vision that combines productive activity and environmental responsibility.

d- **Green marketing**: Some call it ecological marketing, which can be defined as the process of developing, pricing and promoting products that meet the need and satisfy the desire without causing any harm to the environment. It can also be said that it is one of the most important branches of green economics. It includes all activities that can cause or facilitate any type of Exchanges that aim to meet or fulfill the desires and needs of the individual, without causing any harm to the ecological aspect (Nechoua, 2005, p. 17).

e- **Benchmarking**: It is considered one of the most important tools on which the ecosystem intelligence system depends, as it represents the technology that allows identifying the determinants of high efficiency in the performance of the best institutions in the industrial competitive environment. It may give the decision maker lessons on competition, marketing skills, and management methods. And management, and therefore today some institutions may find easy ways out to deal with environmental conditions related to ecological responsibility once they become aware of the way the institutions that preceded them dealt with their commitment to this and try to develop these learned methods in a way that serves the direction of the institution itself.

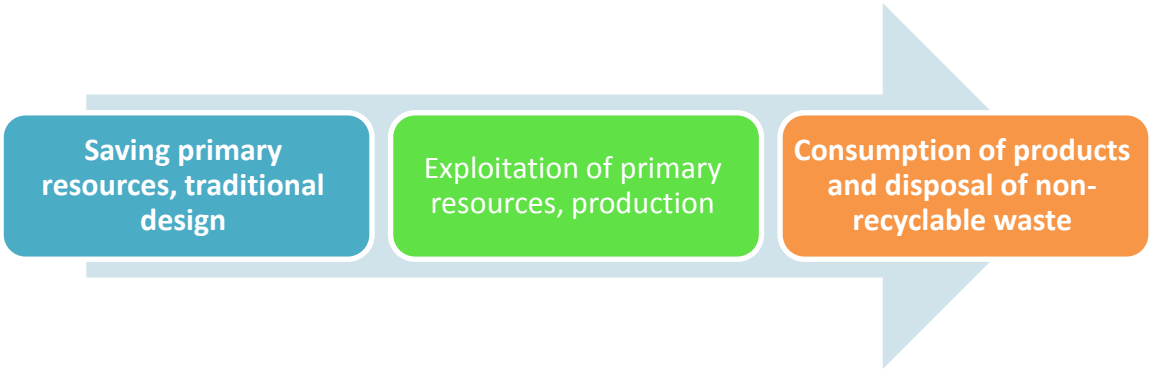
3. A conceptual introduction to the circular economy

The limited and scarcity of resources has contributed to weakening the strength of many countries, especially in the face of the increasing population in the world, which reflects the rise in human needs and the multiplicity of their consumer desires. Despite the progress in manufacturing and production mechanisms, the main model of industrialization has remained largely unchanged. Manufacturing is on huge scales. Without thinking about confronting the crises of recession for these products or taking into account the production factors of excessive energy use and infringement on the surrounding environmental conditions, today it is called linear production,

which established the foundations of linear economies, but the changes that have occurred in the field of technology and competition at the international level and in the face of pressures exerted by some associations and organizations International organizations, whether formal or informal, in the context of preserving the ecological aspect, have generated a modern trend that aims to establish a green economy that is more friendly to the environment, looking at how to transform burdens and waste into new resources.

Most of the international experiences that attempted to clarify the endeavour to achieve sustainable development have confirmed their abandonment of the traditional economic pattern, which they adopted for very long periods. It was known as the linear economic pattern that is, following a single linear direction to produce goods that will become waste after being consumed. This was what was called "from the cradle. To the grave", which is based on three basic processes: provision of natural resources, production of goods, consumption and disposal of waste.

Fig.01: Linear economic model.



Source: Prepared by the researcher by reviewing the following reference: Jianguo Qi, Jingxing Zhao & Other, (2016), **Development of Circular Economy in China**, Social Sciences Academic Press and Springer Science Business Media, P 29.

3.1 The concept of circular economy:

The concept of the circular economy dates back to the year 1976, according to the Swiss researcher specializing in architecture, "**Walter Stahel**", one of the founders of this model. He wrote a book called "From Cradle to Cradle" and published it in 1982, where he points out that the circular economy has different goals from the production economy. Meaning that it works to preserve the value of products, manage inventory, and natural and human capital. However, the origin of the circular economy term came for the first time in a book published in 1989 entitled "The Economics of Natural Resources and the Environment" by its authors, "**David Pearce**" and "**Kerry Turner**", where the book provides an overview of The relationship between the economy and natural resources and how to preserve the environmental aspect in each of them.

The circular economy is defined as the economy that does not produce final

waste except in very small quantities and within the narrowest limits, and does not result in any negative effects on the environment, and is based on recycling components and products, reusing and recycling with high quality, and the goods and products are repairable and renewable from scratch. Beginning with its design to ensure that it can be used many times, and thus ensure the optimal and effective use of available resources, in a way that achieves sustainable development (Rémy, 2018, p. 24). It can also be defined as a sustainable economy based on the use of fewer resources in manufacturing processes, and depends on changing activities and practices related to how to dispose of waste. The following figure shows the most important steps involved in the circular economy**.**

Fig.02: Circular economy model.

Source: Neffah Zakaria et Bettayeb Abdelwahab, (2018),**The circular economy as a basic pillar for achieving quality of life - a case study of the Dutch company DSM**, International Forum on the New Development Model and Quality of Life on, University of Bechar-Tahri Mohamed, p. 06.

3.2. Characteristics of the circular economy

Researchers Esposito et al separated five basic characteristics of the circular economy, which are:

- Waste design.
- Enhancing adaptability through diversity in operations and activities.
- The trend towards renewable energy sources.
- Thinking about environmental systems.
- Thinking about centrifuges.

There are several entrances to the circular economy system related to reusing damaged products and waste, working on creating ecological designs, and striving to ensure a sustainable supply. Consumer culture is also considered an important input in establishing the circular economy and what has become known as responsible consumption.

3.3 Requirements for the transition to a circular economy

In light of increasing environmental and economic challenges, the circular

economy is emerging as a sustainable alternative to the traditional economic model based on consumption and waste. The circular economy aims to reduce waste through reuse, regeneration and recycling, which promotes sustainability and brings long-term economic and environmental benefits. To achieve this transformation, institutions and countries need to adopt a set of basic requirements that include ecological intelligence, innovation in product design, developing waste management infrastructure, enhancing cooperation between different sectors, and adopting supportive policies that encourage sustainable practices. These requirements are the cornerstone of the successful transition towards a circular economy that contributes to preserving resources and achieving sustainable development. Below we will try to present the most important of these requirements.

3.3.1 Ecological intelligence

This system helps to shift very quickly towards establishing a circular economy pattern in different countries, as the interest and commitment of the institutional fabric to environmental responsibility and its endeavor to take the initiative to practice greener productive activities is what opens the way to revive sustainability in economic activity.

3.3.2 Energy transformation

The shift from dependence on depleted energies towards the use of renewable energies is the basic factor that ensures the sustainability of productive activities in a way that allows for the achievement of harmonious and integrated development among members of society.

3.3.3 Digital transformation

Change in the technological field has contributed to influencing production arts and skills, as it has become one of the most important determinants and sources of long-term self-growth in all countries. Therefore, digital transformation may help to quickly transform into a sustainable circular economy pattern, as it allows the flow of accurate information. On the availability of resources and products and their competitive position, and making the performance of institutions more efficient, it also works to grant benefits to institutions for recycling damaged and non-consumable products (Mohamed & abedelhamid sakr, 2006, p. 119).

3.3.4 Ecological production

There is a clear integration between ecological production programs and the ecological intelligence system at the institutional level, as the economic intelligence system in general allows for encouraging the dissemination of sustainable thought within the production process, and the ecological intelligence system in particular may allow for the dissemination of the thought of sound cleaner production technology that is environmentally friendly, and this depends on ecological production. Within institutions (abdelmadjid & barket, 2001, p. 6), there is an

important principle known as the principle of environmental efficiency, which means the institution's ability to optimally exploit available and possible resources, opening the way for it to market goods or services at competitive prices and of high quality, to satisfy human needs and achieve well-being of life, and at the same time be able to reduce the negative effects associated with the production process, as well as Rationalizing resource consumption and reducing costs.

4. The performance of the Algerian economic institution and its role in establishing the circular economy pattern – Ilef Bio Foundation as a model

What draws attention is that Algeria's exports outside of hydrocarbons are still very marginal and may not exceed 11% of total exports for the year 2023, as confirmed by the commodity concentration index of Algerian exports for the same year. Once we return to diagnosing the nature of these imbalances available at the level of the foreign trade sector, we may find that the weak management of economic institutions is what led to this decline in performance. The reality confirms that our institutions do indeed have many capabilities available to them, whether in terms of raw materials, labor, or capital. However, the inability to activate modern management systems in exploiting these resources makes them unable to enter global markets.

Given the increasing global environmental challenges, adopting environmental responsibility has become an essential requirement for businesses. In Algeria, economic institutions are under growing pressure to shift towards more sustainable practices, driven not only by international pressures and government policies but also because this transition opens new avenues for green growth and innovation. To achieve this, Algerian companies must implement fundamental changes in how they manage their resources and design their products and services. This includes focusing on reducing their carbon footprint by improving energy and water efficiency and adopting clean production technologies. Additionally, they should develop environmentally friendly management systems, incorporating recycling, reusing, and waste reduction practices.

Studies indicate that institutions that adopt environmental responsibility achieve multiple benefits, including improving their reputation, increasing customer loyalty, reducing operating costs, and attracting investments in Algeria. Among the most important pioneering local experiences in the context of exploiting the remains and waste resulting from the production or consumption process, we find the Elf Bio Foundation, whose work plan we will analyze in the field of exploiting and transforming the prickly pear product so that it becomes a green product capable of valuing the efforts of the Algerian institutional fabric in reviving the circular economy. The following table shows statistics on the institutional fabric committed to environmental responsibility in Algeria during the period 2011-2023.

Table 01: The development of the number of economic institutions with environmental responsibility in Algeria.

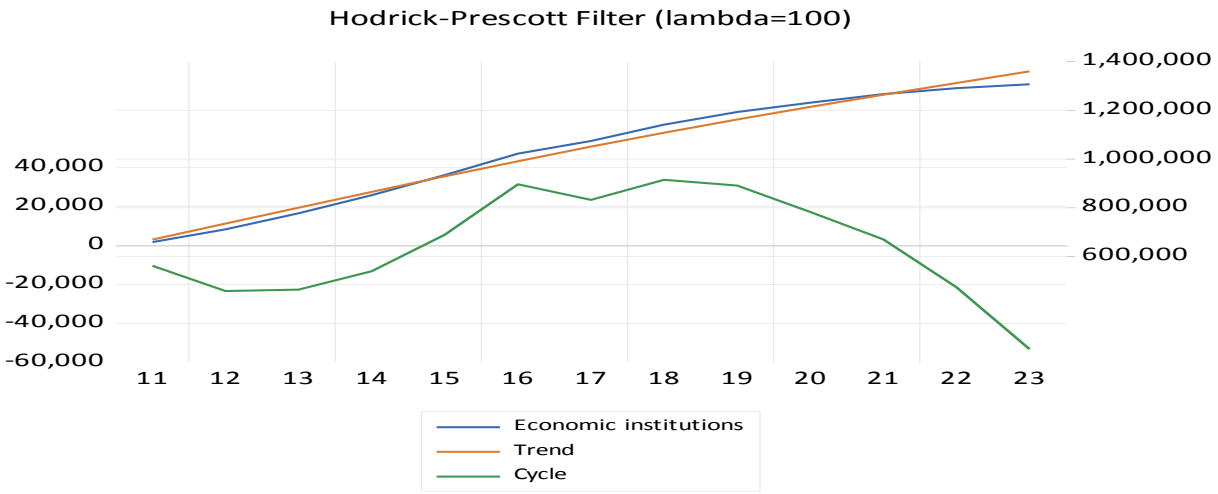
years	Economic institutions	Environmentally conscious startups	Total economic institutions
2011	659288	21	659309
2012	711770	62	711832
2013	777738	78	777816
2014	851965	88	852053
2015	934475	94	934569
2016	1022443	178	1022621
2017	1074212	291	1074503
2018	1141541	322	1141863
2019	1192880	459	1193339
2020	1231073	481	1231073
2021	1266712	508	1267220
2022	1290677	521	1291198
2023	1306899	756	1307655

Source: Ministry of Industry and Pharmaceutical Production (Statistical bulletin).

We note from the table above that the number of start-ups that adhere to the principles of green innovation and have a motivation towards environmental responsibility is constantly increasing between 2011 and 2023, as the Algerian government began in 2011 to embody a national strategy towards environmental responsibility within the framework of its development program called the Program for Consolidating Development in its Sustainable Dimension, in commitment to the principles of the United Nations. This falls within the framework of launching a diversified economic growth model aimed at diversifying the Algerian economy and establishing a small and medium institutional fabric capable of mobilizing financial revenues in hard currency to replace our oil exports to the outside world, as Table No 01 shows that from the beginning of this strategy until the end of the development program in 2015, the number of institutions committed to environmental responsibility reached 94 institutions. This number remained unconvincing compared to the number of institutions in Algeria until 2019. With the beginning of the embodiment of the strategic program of the Ministry of Industry and the Ministry of Knowledge Economy and start-ups in Algeria, the number of start-ups and their responsibilities towards the environment has recovered, as the number of institutions during the year 2020 amounted to 481 institutions. An environmentally responsible startup with a growth rate of 92% compared to 2015, which reflects the awareness of

Algerian entrepreneurs and investors that interest in the field of ecological intelligence is an effort to penetrate foreign markets, especially the European and American markets, and even the African continent market.

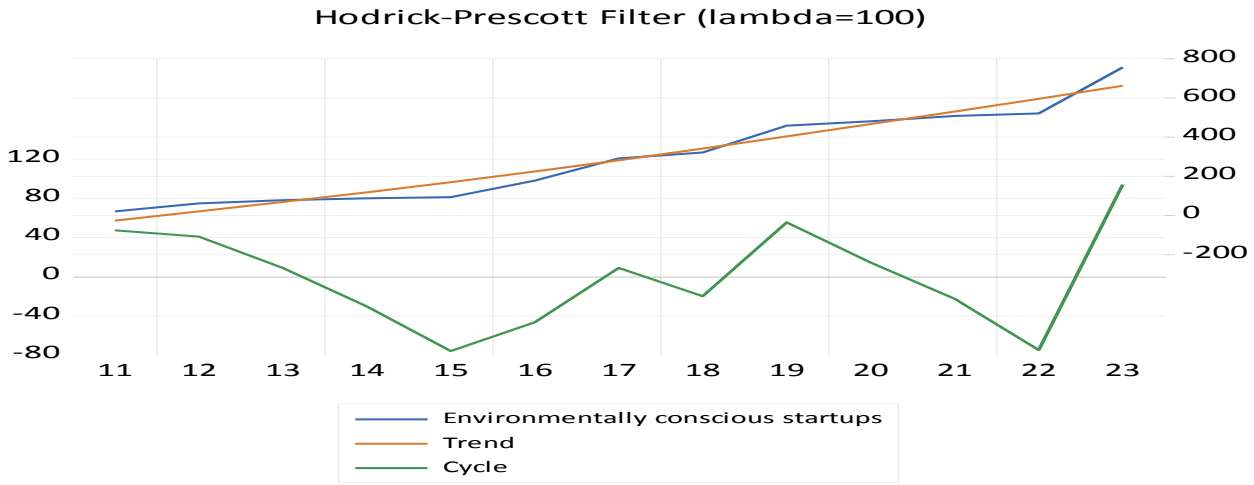
Fig.03: Development of the number of economic institutions in Algeria during the period 2011-2023, growth rate and general trend.



Source: Prepared by the researcher based on the outputs of the Eviews program 12.

Through Figure 03, we notice that the number of economic institutions in Algeria has taken an increasing trend between 2011 and 2023 compared to the needs of the national economy, which confirms that the Algerian government has moved towards establishing a large and effective institutional fabric that serves the country's developmental challenges in general. To confirm this proposal, this study relied on the 'Hodrick- Prescott ,HP' filter method, which is considered one of the most important statistical methods used in smoothing time series and determining their general trend, by calculating the time series (YP_0), so that the variance of the first time series is as little as possible around its second difference. Through this test, we seek to determine the trend of the development of the number of economic institutions in Algeria during the period between 2011 and 2023 to analyze the cyclical growth rate of the institutional fabric in Algeria, as Figure 03 shows that the general trend (Trend) of the variable related to the growth of economic institutions in Algeria is that it is constantly increasing throughout the period between 2011 and 2023, which explains that the Algerian government has shown an effort to change the investment field, especially by amending the investment law and opening the field of Facilities for economic operators through privileges related to granting industrial and investment real estate, and tax and quasi-tax privileges. The general trend component also determines that the expansion of economic institutions is in a positive form compared to the growth of the needs of the national economy throughout the study period.

Fig.04: Development of the number of environmentally conscious startups in Algeria during the period 2011-2023, growth rate and general trend.



Source: Prepared by the researcher based on the outputs of the Eviews program 12.

Through Figure 04 and based on the 'Hodrick- Prescott ,HP' filter method, we note that the trend of emerging institutions that are committed to environmental responsibility is increasing during the study period between 2011 and 2023 in Algeria. This is an indication that Algeria has expanded in embodying circular economy strategies by opening privileges to institutions interested in this matter. In addition, after 2019, it became clear that the Ministry of Knowledge Economy was established to support this trend and diversify the economy with sustainable green growth rates.

4.1 Provide an overview of ILEF BIO

The **Ilef Bio** Foundation was established in 2008 within the framework of the youth support and employment formula by its owner, Mohammed Amir, and is headquartered in the municipality of Bir El Ater in the state of Tebessa. This state is distinguished by its enormous agricultural potential and its productive endeavors in the field of manufacturing industry, especially with regard to the cactus and prickly pear plants. **Ilef Bio** Foundation is one of the most prominent active institutions in the state of Tebessa, as it specializes in growing cactus fruit, harvesting prickly pear fruit, and converting it into various derivatives. The organization aspires to develop a strategy for expansion in international markets, after it was able to introduce its various products at the local and international levels through its continuous presence in local and international exhibitions.

Ilef Bio is one of the leading institutions in producing a package of distinct green products based on prickly pear harvest. These products include prickly pear seed oil, which is effective in removing wrinkles, prickly pear paste, which is rich in health benefits, prickly pear flower soap, which enhances skin freshness, and wrinkle soap made from the aloe Vera plant, known for its moisturizing and anti-aging properties. In addition, the organization continues to develop a variety of other green products that reflect its commitment to innovation and environmental sustainability.

4.2 Adopting the strategy of localizing ecological intelligence at the Ilef Bio Foundation:

It cannot be said that Ilef Bio follows the traditional approach followed by many Algerian institutions in the agricultural sector, as these institutions usually rely on the budget and annual financial results as the main criterion for evaluating performance. In contrast, the director of the Ilef Bio Foundation has excellent management abilities and response to external circumstances, and always seeks to exploit available opportunities. It adopts a participatory management style, which enhances the role of the human resource and workers at all levels of management.

The organization focuses greatly on qualifying and developing workers in various areas of management and administration. In addition, it pays great attention to the competitive factor at the local and regional levels, by establishing links with local and other institutions in countries such as Egypt and Tunisia, as well as in Latin America.

Ilef Bio constantly seeks to improve the quality of its products through cooperation with consulting institutions that help it correct imbalances in marketing performance. Despite these efforts, the organization has not yet been able to obtain international conformity standards or standardization certificates related to quality.

However, what distinguishes Ilef Bio Foundation is its clear strategy in localizing environmental responsibility and embodying green innovations. The Foundation seeks to integrate environmental considerations into all aspects of its work, which enhances its commitment to sustainability and environmental responsibility, and contributes to achieving balanced economic and social performance.

4.3 Ilef Bio: A model of ecological intelligence in agricultural and industrial production

Ilef Bio Foundation relies on important natural inputs represented by cactus and prickly pear fruit in its production processes, which embodies green innovation and ecological intelligence. The Foundation carries out many transformational activities within the Prickly Pear Cultivation and Harvesting Division, where it produces prickly pear fruit and converts its peels into “prickly pear flour or powder.” Also, peeled prickly pears are squeezed to produce prickly pear juice and make prickly pear jam.

The Foundation seeks to exploit the remains of the pressing process by converting prickly pear seeds into prickly pear oil, known as the miracle oil, where one liter of oil is extracted from more than 1.5 tons of dried prickly pear seeds. This oil is used as a raw material in the manufacture of cosmetics and pharmaceuticals. In addition, the remains of pressing the hard shells of prickly pear seeds are used in the composition of the fodder mixture for cattle and cows, which is in great demand in

the Algerian hill states.

The institution also produces prickly pear vinegar from damaged units that fall to the ground and rot, and it squeezes large aloe Vera leaves to extract aloe Vera leaf water for making soap. The organization takes advantage of the spring season to harvest aloe Vera roses to extract the aromatic prickly pear rose water.

Among Ilef Bio's other products are prickly pear soap, aloe Vera soap, moisturizing and skin-lightening creams, and a serum to nourish hair against hair loss. All of these products demonstrate the organization’s efforts to localize ecological intelligence, as they are packaged in healthy and environmentally friendly glass bottles and containers, while the prickly pear fruit is completely recycled without waste during the production and industrial transformation process.

4.4 The challenges facing Ilef Bio in the path of the circular economy in Algeria

The Algerian enterprise, especially in the agricultural sector, faces many problems that hinder its progress towards a circular economy, and the Ilef Bio Foundation is a clear example of these challenges. One of the most prominent of these challenges is the narrow internal market, which prevents the organization from achieving a high level of production that ensures its success, effectiveness, and ability to compete in foreign markets.

Ilef Bio's lack of access to the international market makes it difficult for it to develop its management style, as economic isolation and lack of openness to the modern global economic system prevents it from benefiting from economic intelligence practices. In addition, the weak local management of the economy by state institutions contributes to making local institutions substandard.

Although Ilef Bio offers many programs and models to expand its production activity, it is often faced with rejection. The corporation also faces problems in marketing its products to foreign countries, due to the lack of accompaniment at the international level and the weakness of diplomatic work in its economic aspect. For example, the factory faces problems related to the absence of health inspection certificates from laboratories or customs transit cells in importing countries, which leads to the return of goods and incurring huge financial losses.

4.5 Obstacles that stand in the way of establishing a circular economy in Algeria

There are many obstacles that prevent the establishment of an economic intelligence system in Algeria, and most of them are related to the weak management of the local institutional fabric, which lacks the logic of ecological vigilance and modern management systems. This weakness is mainly due to insufficient government performance in accompanying and supervising the activities of these local institutions. Algeria, as a country, did not give the exchange sectors the utmost importance in the context of finance and supply, and did not seek to make them economically viable institutions.

In addition, local institutions were not given the opportunity to interact with leading external models of management, due to government measures aimed at strengthening national sovereignty in investment, which created barriers to the influx of foreign knowledge. This led to the institutional fabric losing the spirit of innovation and renewal.

Therefore, institutions like Ilef Bio must confront these challenges by exploiting all local energies, striving to control government performance, and expressing a strong political will to enhance sustainability in management within institutions. These institutions must be accompanied internationally and promising future horizons filled with diplomatic guidance and framing in various fields should be opened.

Below we will present the most important obstacles to the localization of the circular economy in Algeria:

- The lack of knowledge about the principles of the circular economy and its importance hinders the adoption of this model, given that many companies and individuals do not realize the benefits of recycling and using resources efficiently, as the awareness rate of environmental concepts in Algeria is less than 30% compared to other countries.
- A shortage of facilities specialized in recycling and disintegrating waste, which hinders waste collection and treatment operations, as statistics from the Ministry of Environment indicate that the percentage of recycled waste does not exceed 25.6% of the total waste in Algeria in the year 2023.
- The lack of a strong legislative framework that supports the circular economy and encourages companies to adopt sustainable practices, as reports indicate that Algeria is still in the advanced stages of developing laws and initiatives that support the circular economy, which leads to delays in implementation.

5. Conclusion

The circular economy is considered the best alternative to the linear economy. International conditions and factors in various fields make it imperative for countries to adopt this sustainable economic model if they intend to achieve sustainable development and meet the needs of present and future generations. The circular economy contributes significantly to protecting the environment, by requiring institutions as basic units for building the edifice of any economy in any country, there is a need to preserve resources and not deplete them in a random manner. Paying attention to waste and recycling is also considered the basis of the thinking of institutions that aspire to practice the circular economy. However, the dynamism surrounding their activity has necessitated the necessity of inventing ways to manage their capabilities and resources in a very intelligent way, as its adoption of an ecological intelligence system is the basis for this. Algeria is considered among the

countries that aspire to establish this sustainable economic pattern in light of the human capabilities available to it, which requires local institutions to develop their management patterns to advance them to the concept of strategic management, or beyond that, By adopting a system of environmental alertness and intelligence if it wants to give the local economy a strong boost, especially in terms of preserving the environment.

After addressing the problem of this study, the study reached a set of results that can be summarized as follows:

- The lack of progress in ecological intelligence reduces the attraction of foreign and domestic investments in sustainable environmental projects.
- Lack of integration of ecological intelligence into the circular economy model limits full utilization of economic benefits such as reducing costs and improving efficiency.
- Due to the lack of effective awareness campaigns and educational strategies, environmental awareness in Algeria remains low. This hinders the widespread adoption of circular economy practices.
- The lack of well-thought-out strategies based on accurate data leads to ineffective planning and uncoordinated application of environmental policies.
- The failure to establish ecological intelligence has led to unsustainable consumption of natural resources, which hinders circular economy efforts to improve the efficiency of resource use.

Finally, we will try to present a set of proposals that may be necessary to activate the ecological intelligence strategy in local economic institutions, which would support the establishment of a circular economy in Algeria.

- Algeria as a country should focus on supporting and framing its institutional fabric to advance it to the concept of green entrepreneurship, by financing research and thinking processes as well as providing the laboratories and facilities necessary to attract innovations and development processes in the field of green production.
- Work to make the local legislative and legal environment helpful and supportive of environmentally friendly economic activities, in order to ensure the process of transformation from a linear economy to a circular economy.
- Change the behavior of managers and even members of society by involving all actors who have a direct impact on the culture and values of individuals, through political discourse, training centers, universities, schools.
- Granting tax and quasi-tax privileges to all institutions that adopt modern management systems that make them more environmentally responsible.

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