

Legal framework for nanotechnology procurement

الاطار القانوني لصفقات توريد تكنولوجيا النانو



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Abstract:

Nanotechnology supply contracts are considered one of the most important goals that Algeria is looking for in order to complete its development projects, including works, studies, supplies and services, in the best possible way and at a low cost. Therefore, the contracting administration had to include contractual clauses in its terms and conditions book that guarantee the supply of this technology and choose the competitor who offers the best offer in this regard. Hence, the procurement law had to frame the conclusion processes in a legal and good way that guarantees the supply of these contracts with high quality without conflicting with the state's constitution and the laws that are subject to it. Especially since these supplies will be included in the international deals that economic traders are competing for

Keywords: Supply contracts; Public procurement; book of conditions; Nanotechnology.

ملخص:

تعتبر عقود توريد تكنولوجيا النانو من اهم الاهداف التي تبحث عنها الجزائر لانجاز مشاريعها التنموية من اشغال ودراسات ولوازم وخدمات على احسن وجه وبتكلفة بسيطة . لذلك كان لابد من الادارة المتعاقدة تضمين دفتر شروطها بنودا تعاقدية تضمن توريد هذه التكنولوجيا واختيار المتنافس الذي يقدم احسن عرض في ذلك ومن هنا كان لابد لقانون الصفقات ان يؤطر عمليات الابرام بشكل قانوني وجيد يضمن توريد هذه العقود بجودة

عالية دون ان تتعارض ودستور الدولة والقوانين التي تخضع لها وخاصة ان هذه التوريدات
ستدخل ضمن الصفقات الدولية التي يتسابق عليها المتعاملون الاقتصاديون .

كلمات مفتاحية: عقود التوريد؛ الصفقات العمومية؛ دفتر الشروط؛ النانو تكنولوجي

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INTRODUCTION

We are currently living in the era of artificial intelligence, where new algorithms are permeating every field of natural sciences, biology, physics, and engineering, relying on technology that studies matter, known as nanotechnology. Nanotechnology is intricately linked to the fundamental understanding of the biological and chemical properties of atoms and molecules, followed by controlling these properties subject to regulation to create materials and functional systems with unique capabilities and various applications. The increasing use of nanotechnology can be attributed to its low cost and the proliferation of products with better service and quality. Its applications include water treatment and desalination, climate improvement, pollution reduction, clean energy production, enhancing pesticide efficacy, improving agricultural crops, refining materials, and many other areas, all employing this technology in novel ways.

However, the provision of this technology must be subjected to legal regulations allowing its appropriate use in accordance with the law. It must be framed in a manner consistent with the state's economic development policy.

In the realm of public works, services, studies, and procurement, which constitute the most utilized contracts by the

state and attract investors, the state's strategy in advancing the burden of public service has been evident. Given the economic weight of these contracts, economic operators seek participation in them, often disregarding the risks posed by technological changes in material algorithms. Their deals may pose threats to the environment and health. Consequently, the state has endeavored to incorporate an environmental respect standard into procurement contracts, focusing on sustainable deals based on cautiously supplying nanotechnology with minimal harm. Therefore, it becomes imperative for contracting parties to ensure that their international specifications for supplying nanotechnology include rational usage and a high degree of awareness of the risks associated with these technologies.

The process of entering into sustainable contracts that consider environmental conditions and utilize nanotechnology within the framework of sustainable development necessitated Algerian legislation to protect it from being one of the major challenges facing the state in general and economic operators in particular. From this perspective, the following issue arises: **what is the legal framework for entering into these contracts amid the state's pursuit of nanotechnology supply and regulating sustainable deals?**

Hence, we have divided this research into two fundamental axes:

The first axis elucidates the concept of nano-deals, while the second delves into the legal regulations for entering into these contracts.

We rely on an analytical approach to expound upon legal texts in alignment with this research.

1. Title

1.1 First Subtitle

Axis One: The Concept of Nano-Procurement Contracts

Public procurement encompasses various types of contracts, including construction, supplies, services, and studies, representing the sum of needs that the state seeks to fulfill. The Algerian legislator, in Law No. 23-12 dated August 5, 2023, which defines the general rules for public procurement, has articulated the legal texts that govern public purchases, reinforcing the fundamental principles to be respected, such as transparency, equality, and freedom of access to public demand³. Additionally, these basic principles are further reinforced by another equally important principle: the new endeavor of every state to respect environmental conditions in all contracts.

However, the funds disbursed from the public treasury under these contracts must consider fiscal prudence and the rational use of public funds. In the era of technology, states seek the best deals with high quality and efficiency, often exploring alternatives to traditional materials, where nanotechnology stands out as a superior alternative. Consequently, economic operators must leverage nanotechnology to enhance their offerings with quality

service at lower costs. Like all nations, Algeria must choose the best offer among the most commonly used contracts employing this technology.

Hence, we will delve into studying the concept of nanotechnology and the nature of these contracts.

1.1- Concept of Nanotechnology - Importance and Risks -

Nanotechnology cannot be pinpointed to a specific era or epoch, although the concept was first mentioned in 1876 when physicist James Clerk Maxwell conducted a thought experiment known as "Maxwell's Demon," which gave rise to the idea of controlling motion at the atomic and molecular levels. This was followed by Richard Feynman in 1959, and in 1974, the term "nanotechnology" emerged, referring to the behavior of atoms when they are in a different state compared to their macroscopic size⁴. So, what exactly is meant by this technology?

*** Definition of Nanotechnology:**

The nanometer is the smallest unit of measurement defined so far. The size of a nanometer is approximately 2.5 times smaller than the diameter of a DNA strand, five times smaller than the diameter of a protein molecule, about 7,000 times smaller than the diameter of a red blood cell, and roughly 80,000 times smaller than the diameter of a human hair⁵.

This minuscule scale has been utilized in technologies aimed at producing and manipulating objects by substituting one atom for another to create new materials. These materials may possess

novel properties previously unknown to us, benefiting humanity in various ways.

In 2000, Muslim physicist Monir Naïfa succeeded in discovering and manufacturing a family of silicon nanoparticles, the smallest of which had a diameter of 1 nanometer and consisted of 29 silicon atoms arranged on the surface resembling carbon fullerenes. However, unlike fullerenes, these nanoparticles contained a single atom inside them. When exposed to ultraviolet light, these nanoparticles exhibited different colors ranging from green to blue to red, depending on their diameter ⁶.

*** The Importance and Risks of Nanotechnology:**

Nanotechnology is considered the most significant technological advancement of the twentieth century, contributing to the development and invention of silicon electronics, such as transistors and electronic components. This innovation gave rise to small chips, leading to a technological revolution across various fields, including communications, computing, and medicine. In the medical field, nanotechnology has facilitated the detection and treatment of diseases. For instance, it has been instrumental in cancer treatment through the use of gold-coated nanoscale capsules to destroy cancer cells. Additionally, nanotechnology has been applied in drug manufacturing, with nanobiotics emerging as a new alternative to antibiotics. Researchers at Hang Bang University in South Korea successfully integrated silver nanoparticles into antibiotics, which possess the ability to kill 650 microbial germs without harming the human body ⁷.

In forensic science, devices employing nanomaterials have significantly advanced forensic medicine by enabling the detection and analysis of samples at the nanoscale, utilizing physical units as additives for chemical elements in criminal investigations. Nano-sensors have been utilized in fingerprint detection, DNA analysis, and brain fingerprinting for crime investigation purposes, serving as forensic evidence to reveal the truth and convict perpetrators. Hence, nanotechnology can be applied in crime scene investigation to determine the age of blood samples and examine physical traces, yielding precise scientific results.

In the industrial sector, nanotechnology has revolutionized various industries, including military, medical, agricultural, and beyond. Raw materials have been enhanced to induce changes in their physical properties at the nano or small scale. Nanoparticles benefit from a substantial increase in surface area relative to volume, affecting their optical properties and particle diameter. Integration of nanoparticles into composite materials significantly impacts the mechanical properties of the material, such as hardness or flexibility. For instance, nanotechnology has contributed to the improvement of aircraft and automobile manufacturing by utilizing nano-enhanced products that are stronger, more flexible, lightweight, and consume less fuel.

Furthermore, it has played a pivotal role in developing "self-cleaning" glass capable of repelling dust and water droplets, as well as producing sports equipment with increased lightness,

flexibility, and strength, such as tennis rackets and hockey sticks. Nanotechnology has also penetrated the refrigerator, washing machine, and water purifier industries, providing microbial-resistant products with resistance to decay and rust. Moreover, this technology has impacted the textile industry, creating clothing resistant to moisture, stains, and dirt through the so-called "lotus effect." It is anticipated that nanotechnology will extend its applications to various vital aspects such as nutrition, agriculture, and the military sector.

However, despite the wide-ranging applications of nanotechnology across all facets of life, there is now a significant interest in researching the potential side effects of its use on human life, the surrounding environment, and protecting consumers from the side effects of this technology.

Nanoparticles, due to their extremely small size, can easily penetrate the skin, lungs, and gastrointestinal tract of humans without understanding their impact on human health. On the other hand, is it conceivable that inhaling nanomaterials (such as nanoparticles, nanoballs, carbon nanotubes, etc.) will lead to the circulation of these materials within the body and subsequently reach the brain?

It is important to note here that there are no specific and clear regulations or laws defining the damages and risks resulting from the use of nanomaterials, and consumer protection law has not dealt with regulating these dangerous uses.

1.2- Nanotechnology Applications in Public

Contracts

States have made their contracts the most commonly used in public procurement, where substantial funds are disbursed from the state budget to the economic operators selected to execute these projects. The organization of contracts has defined them as written agreements within the framework of the applicable legislation, concluded according to the conditions stipulated in this decree for the purpose of completing works, procuring supplies, services, and studies on behalf of the contracting authority ⁹. We find that the most widely used contracts for nanotechnology are construction contracts and study contracts.

***Nanotechnology Construction Contract:**

The construction contract is defined as agreements aimed at completing a facility or construction work by a contractor while respecting the needs specified by the contracting authority, the project owner. It includes the construction, renovation, maintenance, rehabilitation, preparation, restoration, reinforcement, or demolition of a facility or part thereof, including related facilities necessary for its use ¹⁰. Therefore, it can be said that the construction sector is the main consumer of a large number of raw materials and is the most dangerous sector in the use of raw materials harmful to human health and the environment. Hence, the concept of using nanotechnology and presenting nano-construction contracts to improve the design performance of buildings through various nanotechnological materials and their different effects on the properties of traditional

materials and their improvement. This is achieved by establishing design concepts based on nano-architecture that contribute to creating buildings that provide a healthy indoor environment, enhance energy and resource consumption reduction methods, and consider environmental safety while avoiding future risks.

The choice of building material complements the architectural design process because the material achieves the architectural form. The digital revolution has brought about a revolution in building materials, resulting in many modern and advanced building materials—whether basic or complementary building materials. Among the areas of technological impact of nanotechnology in construction contracts is the addition of small quantities of carbon nanotubes to cement to improve its mechanical properties.

Moreover, the tremendous technological advancement in the properties of iron reduces the final cost. Research has shown that adding nano-copper reduces stress, as do new materials such as carbon nanotubes. Carbon nanotubes are one of the applications of nanotechnology. Carbon particles take on a tube-like arrangement inside each other, and they are stronger than discovered building materials; they are a hundred times stronger than steel and about six times lighter in weight ¹.

***Nanostudies Contract:**

The public contract for studies encompasses the completion of intellectual services, particularly technical or geotechnical monitoring skills, supervising work completion, and assisting the

project owner ¹¹.

Contracts carried out by study offices focus on sustainable architecture, where the contracting authority seeks to select the most distinguished designs that respect the environment while considering energy, material, and resource consumption reduction to present the best offer among competitors. In architectural studies contracts, architects aim to introduce nanotechnology to enhance material and energy usage efficiency and space through sustainable designs that do not deplete natural resources, ensuring their sustainability for future generations. Today, contracting authorities require study offices to incorporate nanotechnology into their contracts, presenting building designs that draw minimal water, energy, and natural materials through wastewater treatment and reuse for gardening, along with modern technologies to automatically reduce energy consumption used in building cooling, conditioning, and lighting.

2 - Legal Controls for Nanotechnology Contracts:

The importance of public procurement contracts and the use of nanotechnology is significant nowadays. However, it is necessary to regulate these contracts and their widespread use due to their negative impact on individual and consumer life, which legal experts seek to address through legislation and regulations specific to this field to regulate transactions and provide the best offers.

Therefore, legal studies have been essential in defining the legal nature of these contracts and determining the mechanisms for their conclusion.

2.1- Legal Nature of Nanotechnology Contracts:

All nanotechnology public contracts agree to supply nanotechnology for various uses in other types of contracts, considering the transfer of technology as one of the main points of interest in international law. Defining the legal nature of technology transfer contracts is challenging due to their technical nature and secret execution procedures. Despite the prevalence of such contracts, determining the legal nature of technology transfer contracts is not easy, given their resemblance to some other international agreements. International jurisprudence also differs on the legal adaptation of these contracts and the category in which they fall among international legal agreements.

Algeria, like most countries, has not classified this type of contract despite efforts to understand its nature and the law to which it is subject. Consequently, legal scholars differ in defining the legal nature of this type of contract, considering it as international agreements, administrative contracts, sales contracts, or contracts of sale.

Due to the unclear legal nature of nanotechnology supply contracts and their adaptation differences without specific legal texts, they are considered contracts of a special nature pending explicit legislation for this type of contract. The nanotechnology supply contract can be considered as named contracts through identifying the main commitment of the contract and making it the subject matter, while the other obligations are subordinate to the main commitment. It can also be considered unnamed contracts,

meaning they are outside the regulatory frameworks specified by the law exclusively.

2.2 Enhancing Legal Conditions for Nanotechnology Contracts:

What is applied in concluding contracts is their complete compliance with the regulated procedures for these contracts, which the Algerian legislator did not leave to the discretion of the contracting authority but subjected them entirely to global principles of transparency, equality, and fair competition reflected in legal procedures to ensure fair competition. Thus, the legislator in the Public Procurement Law has regulated the process of conclusion and selection of the best offers that serve the public interest and protect public funds.

As nanotechnology contracts are a new concept, it is necessary to strengthen legal controls to obtain the best offer in the contract and protect the consumer who will be affected if the contract deviates from its defined framework. Therefore, emphasis must be placed on the legal procedures announced in the midst of nanotechnology contracts.

2.2.2 Identifying Ecological Deal Needs:

Identifying needs is considered the first stage undertaken by the contracting authority when preparing for a public contract. Needs must be accurately identified in terms of their nature and quantity, based on clear technical and artistic specifications. Therefore, before proceeding with the contract process, the contracting authority must identify its needs. This stage in itself influences

environmental protection by the potential integration of environmental conditions in meeting its needs within the framework of technical conditions.

3.2.2 Preparation of Specifications in Nano Contracts:

The specifications document is the basis for forming the contract and is the most important form embodying competition, as it determines the qualities for concluding and executing contracts within the regulatory provisions. Establishing competition rules leads us to develop precise project specifications before commencing procedures, intending to present them to potential competitors. This is facilitated by a fundamental tool in the field of public contracts, namely the specifications document, which is considered the model contract issued by administrative decision, including the general framework of administrative and financial terms for the public contract, whether it relates to works, supplies, or services ¹².

Article 26 of Chapter 1, Section 3 of Decree 15-247 states: "The updated specifications clarify the terms under which public contracts are concluded and executed."

Hence, it is found that the legislator did not provide a specific definition for specifications documents, but emphasizes their individual nature in preparation by the administration, which can be individually modified before any contracting. Therefore, contracts that respond to nanotechnology under legal and legislative controls must be predefined in these documents, including provisions that bind the contractor to comply with them,

especially in international contracts as a condition for supplying nanotechnology contracts.

The general administrative specifications document is the document shared by all types of contracts. This type of document includes general provisions applicable to all contracts for works, supplies, studies, and services concluded by contracting authorities and approved by executive decree defining the forms and methods required to assess the compliance of the required product or work, as well as determining technical specifications and ensuring the alignment of project implementation plans with international standards clearly.

Today's need for concluding nano contracts under legal controls requires the formulation of specifications documents that align with their nature.

Those observing note the absence of general administrative specifications documents applied to all works contracts and all supply contracts approved by decree, whether under the Public Procurement Act of 1967 or subsequent laws. What has been issued has faced significant stagnation concerning the general administrative specifications approved by the decision issued on November 21, 1964, limited to public works contracts concluded by the Ministry of Renewal of Construction, Public Works, and Transport, most of which have become outdated and no longer align with the developments and specific shifts in the economic aspect of public contracts.

When preparing instructions for a nanotechnology supply

contract, the contracting authority must ensure a set of provisions that institutionalize the integration of environmental considerations and dimensions. Regarding the selection of the contracting party, environmental standards should be integrated into selection criteria. However, there are no explicit provisions in public procurement regulations that acknowledge this, making the contracting authority free to adopt environmental considerations in the aforementioned stages or not.

3.2.2 Selecting the Best Offer Economically:

Decree 15-247 stipulates that the contracting authority's selection of the offer is based on several criteria under the name "best offer" rather than "lowest offer," considering economic advantages such as quality, execution or delivery deadlines, price and total cost, acquisition and use, aesthetic and functional aspects, efficiency related to the social aspect of promoting vocational integration of unemployed and disabled persons, and efficiency related to sustainable development. Additionally, technical value, post-delivery service, and technical support are considered. According to the specifications document, the best offer in terms of economic advantages is selected among the offers:

1. The lowest priced among the financial offers of selected candidates, when the subject of the contract allows, and in this case, the evaluation of offers is based solely on the price criterion,
2. The lowest priced among technically qualified offers if it concerns ordinary services. In this case, the evaluation of

offers is based on several criteria, including the price criterion,

3. The one obtaining the highest score based on the preference of several criteria, including the price criterion, if the selection is primarily based on the technical aspect of the services.

In the case of limited tendering, the best offer in terms of economic advantages is selected based on the preference of several criteria.

In the event of a competition, the committee for opening envelopes and evaluating offers suggests to the contracting authority a list of accredited winners. Their financial offers are subsequently examined to select the best offer in terms of economic advantages based on the preference of several criteria, and the evaluation of offers is carried out by the committee for opening envelopes and evaluating offers as stipulated in Article 71 of the decree. In this capacity, the committee for opening envelopes and evaluating offers performs the following tasks:

- Disqualification of nominations and offers that do not comply with the content of the specifications document prepared in accordance with the provisions of this decree and/or the subject of the contract. In cases without an initial selection stage, envelopes containing the technical, financial, and service offers related to disqualified nominations are not opened when necessary,
- Analysis of the remaining offers in two stages, based on the

criteria and methodology stipulated in the specifications document.

However, international procurement requirements and the supply of nanotechnology contracts must ensure the selection of the best offer for the nanotechnology contract item under legal controls and environmental protection. Many materials used, especially in procurement, inevitably lead to harm to human health and the environment in general.

3.2.2 Integration of Environmental Dimension in Nano Contracts:

Given the current developments in the field of nanotechnology, it has become necessary for governments, international governmental and non-governmental organizations active in the environmental field, researchers, and scientists to establish robust environmental standards based on risks for products relying on nanotechnology. This is aimed at avoiding potential threats to the environment and sustaining green cities in light of the emergence of the right to live in a healthy environment as a fundamental right of individuals.

Environmental protection laws within the framework of sustainable development include what is known as classified facilities subject to special procedures for their establishment due to the potential deterioration or harm they may cause to the environment. In this context, institutions operating on nanotechnology may pose a risk to the environment and thus be classified. The Algerian legislator defined classified facilities as

factories, workshops, and establishments owned or operated by any natural or legal person, public or private, that may pose risks to public health, cleanliness, security, agriculture, environmental systems, natural resources, sites, landmarks, tourist areas, or may disrupt neighborhood comfort. Therefore, the use of nanotechnology may be one of the reasons for classifying institutions within the list of classified facilities.

The right to live in a healthy environment has been recognized as a right of successive generations, leading the Algerian constitutional legislator to include this right in all its constitutions for citizens: **"The right to a healthy environment / The state works to preserve the environment / The law defines the duties of natural and legal persons to protect the environment."**

Thus, in the case of concluding an agreement or treaty on the supply of nanotechnology or related supplies or services that may affect the environment and the right of individuals to live in a healthy environment, the agreement is considered void.

Examining the texts of Presidential Decree No. 15-247 regarding the regulation of public procurement and authorizations of public facilities reveals a single provision related to environmental protection, namely Article 95, which stipulates the data to be included when concluding each public contract. It requires the inclusion of clauses related to environmental protection and sustainable development and considers them supplementary data. Herein lies another problem, as the necessary importance is not given to the environmental dimension in regulating public

procurement by considering it as supplementary rather than primary and essential data.

Despite the absence of other explicit legal texts regulating public procurement that address the environmental dimension, other provisions can be deduced based on the spirit of the texts contained therein. The environmental dimension can be considered at all levels of the public procurement process, starting from the announcement of the contract, then inviting competition, and finally executing the public contract. Environmental clauses should begin with defining the contract's objective and its technical specifications, leading to the selection of contractors, thus making the contract an ecological one par excellence.

Conclusion:

Our study concludes that through an attempt to research the legal framework of nano-technology supply contracts, the absence of a specific legal framework for this type of contract becomes evident despite its importance and its place among the essentials that have become part of individuals' daily transactions. It also becomes clear that nanotechnology, despite its advantages, may be one of the factors affecting the environment in the absence of strict and legally established environmental standards that allow for achieving a balance between the benefits of nanotechnology and environmental protection and the sustainability of green cities from its dangers. Despite the existence of legal texts acknowledging the priority of environmental protection, this remains incomplete within the framework of nano-technology

supply contracts in the absence of specific laws governing this technology, making the environment a constant that cannot be violated in the exploitation of nano-technology.

Given the lack of clarity regarding the legal nature of nano-technology supply contracts and the necessity of incorporating the environmental dimension into such contracts, we deemed it appropriate to present a set of recommendations:

- The necessity of having national legislation specific to nano-technology supply contracts, especially in developing countries including Algeria.
- Granting the necessary importance by legal professionals and international and national organizations to nano-technology supply contracts to reach a legislative framework specific to this type of contract.
- Emphasizing the environmental dimension within the framework of sustainable development during the conclusion of nano-technology supply contracts regardless of their legal adaptation, especially within the framework of regulating public procurement, by enshrining legally the environmental considerations and sustainable development at all stages of concluding contracts for nano-technology services.

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