



**The Iranian Nanotechnology Initiative
of the Islamic Republic of Iran**

**The Future Strategy
The Islamic Republic of Iran's ten-year nanotechnology
Development plan
(2006-2015)**

**Second Complementary Document
(2009-2011)**

**First Edition
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1- Introduction

Nowadays, Nanotechnology is considered a key technological motivator for the development of many communities around the globe; similarly, in Iran there has been no time gap in understanding the importance and making necessary decisions about this novel science. In the year 2001, the (presidential) Technology Cooperation Office initiated a smart move in the field of nanotechnology through holding various seminars, data banking, the publication of different books and newsletters along with arranging several meetings with prominent figures of the field.

Through these efforts, nanotechnology gained national priority in the country, and thereafter, the Iranian Nanotechnology Initiative INIC (now Council) was setup in 2003 with the aim of pursuing the development of nanotechnology in the country.

The vision of this council is to formulate a long-term nanotechnology action framework.

Based on the paragraph B and article 43 of the law, its first draft was drawn up and adopted in the Fourth Development Plan of the Council as "The Future Strategy" Document in July 2005. The document aims to improve Iran's global standing in the field of nanotechnology to world 15th in order to generate wealth and improve the quality of life in the country. Considering the organization's received feedback and following the implementation and evaluation of its executive activities, the secretariat aims to hand over the draft of the second complementary document for the next three years (2009 -2011).

2- Features of the second Complementary Document

The following items will be discussed in the second complementary document:

- A step by step explanation of the nanotechnology vision
- Classified plans under wealth chain subheadings ranging from proposals to marketing, which will contain detailed information about the aims and funds of each subheading.
- Detailed description of the implementation mechanisms and conditions for granting assistance in each plan.
- Policymaking and evaluation
- This document also consists of a special perception regarding the private sector and provides them with a certain share. It should be noted that a part of the Nanotechnology initiative Council funding is dedicated to encourage other sections to help promote nanotechnology.

3- Time table

In line with the fourth and fifth development plans (2006-2015) and based on the first ten years of the country's next 20-year vision, a ten-year schedule has been set.

The following tables show the council's ten-year prospect strategy divided into four phases:

Table 1- Implementation timetable of the Future Strategy

Phase	Duration (Year)	Beginning	Ending
First	3	2006	2008
Second	3	2009	2011
Third	2	2012	2013
Fourth	2	2014	2015

- The details of the activities of the second phase (2009-2011) of the prospect strategy's second complementary document will be amended based on the feedback received after the implementation of the plans from the first phase.

4- Achieving step by step vision

- Each year, the evaluation indicators assess the country's status among other active countries through considering three major factors including the scientific, technological and fiscal productivity rate.
- The country's standing regarding each of the abovementioned factors should be improved at different periods of time so that the country would be able to meet deadline of becoming world number 15.

Table 2- Achieving step by step vision

Strategic targeting Evaluation Phases	Science production		Technology production		Wealth production	
	Index rate (number of published articles)*	Rank	Index rate	Rank	Index rate	Rank
First phase	419	25	Under examination	30	Under index selection	
Second phase	1060	20				
Third phase	1530	17				
Fourth phase	1900	15		15		15

- The number of nanotechnology-related articles published in international journals by Iranian researchers.
Additionally, the Nanotechnology Council also evaluates the quantitative and qualitative aspects of the country's scientific and technological level each year.

5-The implementation plan framework

- The implementation plan should cover all the chains from production to marketing
- In addition, the promotional plans look to draw individuals from different social classes in a bid to provide the necessary infrastructures for activating the chains,
- Based on the model provided in figure 1, the implementation plans are categorized into 6 sections:

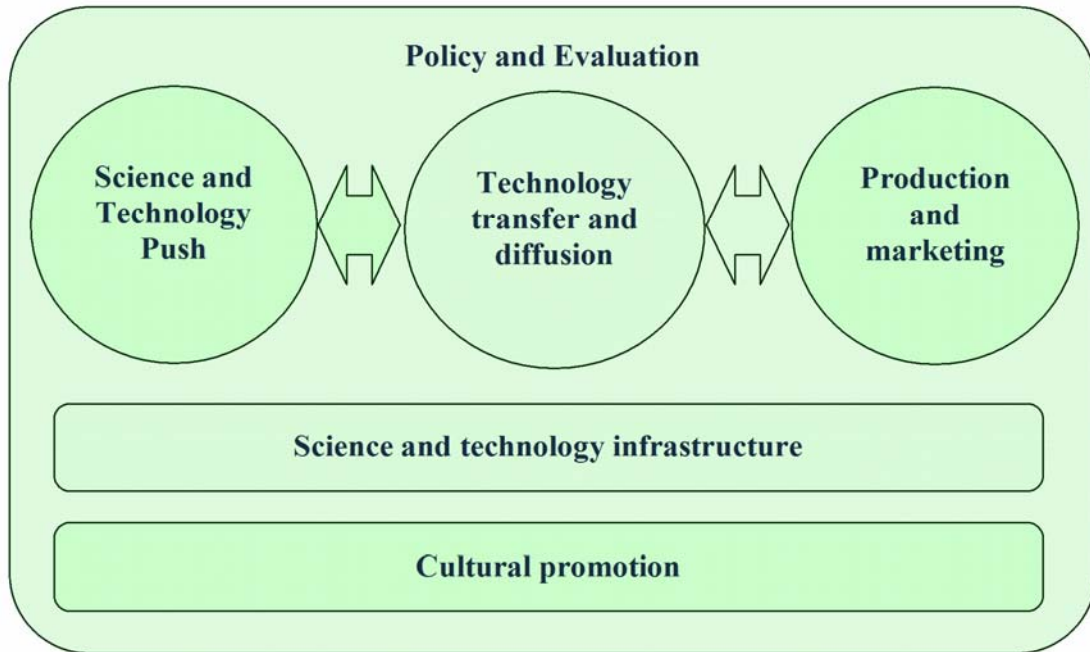


Figure 1-The implementation framework plan for Nanotechnology

- Each section has its own evaluation indexes for various time frames.
- The implementation mechanisms are to be updated over different periods of time.

Table 3- Function and their Executive programs

No.	Function	Program Code	Executive program
1	Cultural promotion	1	K-12 educational program
		2	Encouraging promoters
		3	Information dissemination
2	Science and technology infrastructure	4	Laboratory network
		5	IP
		6	Nanometrology
		7	Standardization & safety
		8	International interaction
		9	Funding
		10	Knowledge management
		11	Rules and regulations
3	Science and Technology push	12	Post graduate research
		13	Encouraging researchers
		14	Technology production
		15	Promoting training standards
4	Technology transfer and diffusion	16	Technology incubator
		17	Technological and industrial monitoring
		18	Promote in industry
		19	Technological transfer and attraction
		20	Technology transfer and diffusion institution
		21	Meeting demands and resolving problems on national levels
		22	Investment incentives
5	Production and marketing	23	Business network management
		24	Market development
		25	Improving business management capacities
		26	Funding facilities
		27	Enterprise technology development
6	Policy and Evaluation	28	Strategic evaluation (STI Evaluation)
		29	Institutional evaluation
		30	Program evaluation
		31	Technology priority setting
		32	Nano S&T Policymaking
		33	Human resources monitoring

6- Cultural Promotion

This section deals with public information dissemination regarding nano-science, technology and industry. The following table outlines these plans:

Table 4 - Executive programs of cultural promotion

No.	EP ¹	Title	Implementation mechanisms
1	K-12 educational program	Public training with emphasis on the K-12 educational program	<ul style="list-style-type: none"> • Adding nanotechnology-related materials in the curricula • Building the knowledge of educators • Arranging seminars and training workshops • Improving the nanoclub website (www.nanoclub.ir) • Producing nanotechnology training material
2	Encouraging promoters	Encourage institutes to promote awareness about nanotechnology	<ul style="list-style-type: none"> • Encouraging industrial-specialized journals to promote awareness among the industrial sector • Encouraging news agencies and newspaper, and national media to promote public awareness • Encouraging the promotional activities of scientific machineries and student teams
3	Information dissemination	Policy information rendering, and planning the country's Nanotechnology activities	<ul style="list-style-type: none"> • Continuing the publication of nanotechnology journals • Improving the Nanotechnology initiative Council's website • Providing foreign spectators with adequate information • Participating in different exhibitions with the , aim of promoting global awareness • Holding annual exhibitions on national nanotechnology capabilities • Hosting competitions on symbolic designs drawing

1 . Executive program

7- Science and Technology Infrastructure

This chapter deals with the required infrastructures for nanotechnology development. The following table offers a list of plans for this objective:

Table 5 - Executive programs of science and technology infrastructure

No.	EP	Title	Implementation mechanisms
4	Nanotechnology network	Promoting the nanotechnology laboratory network's hardware and software by giving priority to the expansion of domestic production capabilities	<ul style="list-style-type: none"> • supporting laboratories in obtaining international standards (ISO17025), • Supporting the adoption of know-how and the use of lab equipment components • Supporting the producers of such equipment through pre-purchase mechanisms • Supporting new system developments for labs, management and offering lab services (user designs, administrative automations based on ISO17025 standards, E-lab. services ...) • Interaction with other labs and centers in other countries • Holding training courses and technology based abroad missions for training lab technicians • Supporting professional laboratory equipment workshops by cooperating with repairmen, specialists and expert technicians
5	Intellectual property	Supporting the production, protection and application of nanotechnology's intellectual property	<ul style="list-style-type: none"> • Granting commendatory awards to institutes and individuals for producing and registering patents • Supporting the setup of IPTLO in active nanotechnology centers • Supporting the set up of IP service firms by private sectors • Supporting patent sales • Manpower training for registering and protecting IP

No.	EP	Title	Implementation mechanisms
6	Nanometrology	Creating and empowering nanometrology centers and developing nanotechnology lab equipment	<ul style="list-style-type: none"> • Design and setup of nanometrology center • purchasing metrology and advanced analysis equipment considering the priorities determined by the INIC • setting up a databank for nanotechnology lab use • Supporting financial and incubation facilities for manufacturing nanotechnology lab equipment
7	Standardization and safety	Adopting and applying safety and quality control standards along with monitoring mechanisms	<ul style="list-style-type: none"> • Preparing and adopting national standards with the aid of standard institutes while keeping in sight priorities and domestic products • preparing a system for offering quality approval services to domestic and regional companies • Active presence in the international nanotechnology standardization Committee and participating in the adoption of international nanotechnology standards • Adopting a positive approach toward nanotechnology safety with the aim of protecting the interests of producers and consumers • Providing a monitoring system for observing compulsory standards • Strengthening the nanotechnology committee through the identification of specialists and experts and cooperation with of them
8	International interaction	Providing interactive infrastructures with regional and international organizations	<ul style="list-style-type: none"> • providing regional nanotechnology networks • membership in regional and international nanotechnology • setting up a focal point for regional and international organizations

No.	EP	Title	Implementation mechanisms
9	Provide financial support	Provide infrastructure for financial resources sustainable both on local and foreign levels	<ul style="list-style-type: none"> • Attracting financial resources form international agencies • Attracting foreign investment • Setting up a nanotechnology investment fund
10	Knowledge management	Supporting data collection, distribution and the dissemination of information on nanotechnology for various target groups	<ul style="list-style-type: none"> • Providing an intelligent databank to gather production-related information for governmental and nongovernmental sectors • Preparing and collecting required information for decision making in active institutes • Saving and processing of reliable information • Offering reliable and adequate information
11	Rules and regulations	Following up on the adoption of supportive rules and regulations and setting up an arbitrary system	<ul style="list-style-type: none"> • providing an arbitrary system for solving problems between nanotechnology activists • follow up on the appointment of an official judiciary expert in the field of nanotechnology • recommending rules and regulations for the development of nanotechnology and resolving existing problems • Recommending insurance amendments and customs' regulations with the aim of facilitating nanotechnology activities

8- Science and Technology Push

This chapter deals with scientific and technological approaches in the innovation process. The following table outlines the main objectives of this chapter:

Table 6 - Executive programs of science and technology push

No.	EP	Title	Implementation mechanisms
12	Post graduate research	Encouraging postgraduate dissertations aimed at fulfilling national needs	<ul style="list-style-type: none"> • Providing professors and Grad and post grad students with support • Encouraging international cooperation in writing dissertations • Holding student meetings in order for them to present the results of their dissertations
13	Encouraging researchers	Granting rewards to researchers and institutes for scientific and technological achievements	<ul style="list-style-type: none"> • Encouraging the writing of papers which are: <ul style="list-style-type: none"> ○ ISI ○ English /Persian scientific research ○ Presented at reliable international forums • Encouraging researchers in technological missions to obtain techniques and technology
14	Technology production	Producing new technologies through aiding the development of ideas and identifying innovation opportunities	<ul style="list-style-type: none"> • Identifying innovators with a vision • Providing a link between those five ideas and scientific and industrial needs • Identifying top researchers for developing ideas • Identifying sources of innovation • Handling innovative technological projects • Cooperation in innovation projects • Setting up a monitoring centre for innovative projects • Making use of the ideas of foreign specialists • Preparing a registration plan to establish links with other researchers and innovators

No.	EP	Title	Implementation mechanisms
15	Promoting training quality	Promoting quality by holding post graduate and other nanotechnology courses	<ul style="list-style-type: none"> • Determining centers to focus on the dissertation of nanotechnology students • Designing and holding training courses in partnership with the industrial sector • Helping convene courses in partnership with centers dealing with higher scientific and technological potentials • Promoting quality by holding conferences and nanotechnology workshops

9-Technology Transfer and Diffusion

This chapter deals with the transfer and dissemination of research results to industries. This chapter aims to:

Table 7 - Executive programs of technology transfer and diffusion

No.	EP	Title	Implementation mechanisms
16	Technology incubator	Supporting newly established nanotechnology companies in development centers	<ul style="list-style-type: none"> • Setting up nanotechnology virtual development centers through partnership with development centers for supporting companies and nanotechnology focal points • Providing maximum synergy in companies and the focal points in each center • Supporting the services needed by companies and focal points • Encouraging the directors and staff of development centers for every contribution made to companies or focal points of development centers
17	Technology and industry monitoring	Creating mechanisms to identify nanotechnology opportunities in industry and marketing and introducing them to related areas	<ul style="list-style-type: none"> • Supporting enterprises by providing required information • Supporting machineries and other institutes for collecting information needed by industries • (this required information must be based on the knowledge management plan and must enter the data base)
18	Promote in industry	Support and planning for engaging nanotechnology in the current industries of the country	<ul style="list-style-type: none"> • Identify needs of industries • Support plans which introduces nanotechnology applications in the industry • Encourage directors in the industrial sector to visit exhibition • Evaluating domestic research and technology and introducing them to industries (techno markets) • Helping prepare technology contracts • Supporting feasibility studies for the industrial application of nanotechnology

No.	EP	Title	Implementation mechanisms
19	Technology transfer and attraction	Supporting the transfer of technology and the attraction of nanotechnology in enterprises	<ul style="list-style-type: none"> • Supporting the transfer of developed technology to enterprises • Supporting the joint ventures of foreign and domestic companies • Encouraging enterprises to learn and acquire the know-how • Supporting localization and technology development in enterprises
20	Technology transfer and diffusion institution	Setting up and developing intermediary institutes for the transfer and dissemination of technology	<ul style="list-style-type: none"> • Supporting the data bases of intermediary institutes • Encouraging intermediary institutes after signing contracts for technology transfer • Encouraging intermediary institutes to offer services for the transfer and dissemination of technology to enterprises
21	Removing needs and problems on a national level	Coordination between the country's organizations in applying nanotechnology in alleviating the needs and resolving problems	<ul style="list-style-type: none"> • Identifying national needs and problems solvable by nanotechnology • Dividing work between different institutions for resolving outstanding problems • Supporting development by purchasing domestic technology by government departments
22	Investment incentives	Support VCs in nanotechnology	<ul style="list-style-type: none"> • Joining the VCs of individuals and capital funds • Introducing investment opportunities • Supporting feasibility for investment plans

10-Production and marketing

This chapter deals with the market force for nanotechnology development and it emphasizes on the nano industrial clusters in a targeted form and it includes the following plans:

Table 8 - Executive programs of production and marketing

No.	EP	Title	Implementation mechanisms
23	Business network management	Strengthen nanotechnology company network	<ul style="list-style-type: none"> • Interact with governmental bodies for offering assistance and facilities to enterprises • Interact with techno parks and industrial town for establishing companies • Evaluate and rank nanotechnology companies • Set up and strengthen private sectors for offering services to the network companies • Information dissemination through websites
24	Market expansion	Support business and market expansion for nanotechnology enterprises	<ul style="list-style-type: none"> • Support marketing activities of enterprises such as publicity and taking part in various domestic and foreign companies • Support marketing research of enterprises • Offer export customs and incentives for entering international markets • Support licensing for entering the markets • Create mechanisms for using joint brands of the enterprises • Use mechanisms to guarantee governmental purchase for access to the market

No.	EP	Title	Implementation mechanisms
25	Strengthen business management empowerment	Support training, promotion of human resources of the nanotechnology enterprises	<ul style="list-style-type: none"> • Help vocational business training to enterprise directors • Support nanotechnology specialists in enterprises • Support counseling services by enterprises • Encourage entry of entrepreneurs into nanotechnology companies
26	Financial and credit facilities	Help attract financial and credit facilities for enterprises	<ul style="list-style-type: none"> • Provide link with banks and other financial institutes • Offer subsidiary grants with facility profits • Accept bank guarantees needed by enterprises through agents • Offer financial services for sale products
27	Enterprise technology development	Help Technology development of enterprises	<ul style="list-style-type: none"> • Offer facilities for purchasing domestic technology • Offer counseling for domestic and foreign partners for enterprises • Support joint plans of enterprises for collecting basic materials and equipment • Support receiving standardized products • Help register and protect patents of enterprises • Help with international interactions with enterprises for nanotechnology development

11-Policy and Evaluation

This chapter emphasizes on leading and evaluation of policies, plans and nanotechnology and science institutes in the country.

The plans are as follow:

Table 9 - Executive programs of policy and evaluation

No.	EP	Title	Implementation mechanisms
28	Strategic evaluation	Strategic evaluation of the international status of the country in nano science, technology and industry according to the ten year vision of nanotechnology	<ul style="list-style-type: none"> • Identify, prepare and improve index evaluation of nano science, technology and industry • Determine annual quality objectives in science, technology and industry production within the vision • Determine the country's annual status in science, technology and industry
29	Institutional evaluation	Evaluation and ranking of effective institutes in nano science, technology and industry development within its vision, aims and plans of the future strategies' document	<ul style="list-style-type: none"> • Prepare and improve indexes suitable to ranking of effective institutes in nanotechnology development • Annual ranking of effective institutes in nanotechnology development • Annual evaluation and ranking of executing institutes of the document plans • Hold annual festivals on top science, technology and industries for introducing and appreciating their efforts
30	Program evaluation	Evaluation and recording of the impact and efficiency of policies and plans of nanotechnology development	<ul style="list-style-type: none"> • Correct recording of plans (accurate understanding of objectives, activities, resources, impacts of plans and hierarchical relationship between them) • Select a collection of key measure for evaluating the implementation of plans • Evaluation of plans and to give guidelines for their improvements • Publish annual reports on the plans

No.	EP	Title	Implementation mechanisms
31	Technology priority setting	Prepare and upgrade national priorities of nano science ,technology and industry and endeavor to achieve results by mainstreaming priorities into all plans and institutes	<ul style="list-style-type: none"> • determine nano science, technology and industry priorities and to offer them periodical upgrading • prepare the result giving process of the priorities • divide institutional work • mainstream priorities in all policies and plans of nanotechnology development
32	Nano S&T Policymaking	Assist in the policymaking and enhancement of decision makings within the area of nanotechnology for facilitating the policymaking process and implementing adopted policies	<ul style="list-style-type: none"> • support set up of intellectual centers • hold programs on future intellects • empower nanotechnology committees
33	Human resources monitoring	Evaluation of education, training and employment of human capital in nanotechnology	<ul style="list-style-type: none"> • monitoring of supply and demand of work force • Human resources mobility • Planning of human resources development

12- Budgeting

- Considering that achieving the 10 year vision document requires achieving a 2% share of the science and technology production and nanotechnology global wealth, it is necessary for the government to allocate at least 2% of the budget of world governments to nanotechnology.
- The budget plans of the council are in the form of incentives
- Budget distribution is determined as follows:

Table 10 - The Budget Distribution with various functions

Range	chapters	Budget percentage of plan years	
		First period (2006-2008)	Second period (2009-2011)
1	Cultural promotion	4	4
2	Science and technology infrastructure	30	27
3	Science and Technology push	12	16
4	Technology transfer and diffusion	12	16
5	Production and marketing	7	12
6	Policy and Evaluation	12	11
Total		100	100

- Change in the budget distribution in the second period is possible based on the conditions of attracting budget in various plans
- The INIC 's approach should move towards increasing the private sector's share in nanotechnology investments

Table 11- The Budget Distribution with various investment sectors

Range	Investment in nanotechnology	Budget percentage of the year plans	
		First period (2006-2008)	Second period (2009-2011)
1	Centralized sections of the INIC	60	45
2	Other governmental budgets	25	30
3	Private sector investment	15	25
total		100	100

13- Allocating special budget system for every plan

- The executive regulations for every plan include implementation plan conditions, the conditions of the implementer and the amount of incentives approved by the INIC.
- The specialist institutes will be determined for each plan by INIC
- All requests made by individuals or institutes to receive these incentives will be determined by the INIC and working groups.
- Public expenditure of nanotechnology committees will be provided by INIC
- The implementer of the plan will be supported by the specialized body of the executive regulations

14- Priorities in nanotechnology

Nanotechnology priorities in this document will be determined based on general criteria:

1- General Priorities in science and technology in the country

In addition to nanotechnology, 7 other areas are also determined by the presidential undersecretary

2- The country's needs, problems and advantages

3- Good opportunities in the field of nanotechnology

Accordingly, five applicable areas have been selected as nanotechnology priorities:

Table 12 - Nanotechnology priorities in INI

General prioritized topics	Subtopic examples	Examples of joint technologies
Energy	<ul style="list-style-type: none"> • Energy conservation • Solar cells • Transform fossil fuels • Improve the quality of chemical cells 	<ul style="list-style-type: none"> • Nano filter • Nano catalyst • Nano composite • Nano coatings • Nano particles • Nano bios • Nano sensor
Health	<ul style="list-style-type: none"> • Novel drugs • Diagnostic kits 	
Water and environment	<ul style="list-style-type: none"> • Water filtration • Desalinate 	
Materials	<ul style="list-style-type: none"> • Nano composites 	
Structure	<ul style="list-style-type: none"> • Anti erodent • Strengthen buildings and foundations 	