Hashemite Kingdom of Jordan

The Higher Council for Science and Technology

National Innovation Strategy 2013 - 2017

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The National Innovation Strategy 2013-2017

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Executive Summary

Jordan seeks to initiate the innovation economy through recruiting effective manpower, using the available institutional potentials built up and developed over long years through Public Private Partnership (PPP) and efforts exerted by innovative and pioneering individuals. Due to the difficult international and regional economic conditions, harnessing innovation to serve economy has become a dire need more than before. Arguably, getting out of the bottleneck depends on making the national innovation as the basis of economic and social development.

Based on the confirmed data related to the role of innovation in the efficacy of economy, interdependence between technology and initiative increases, leading to creating investment opportunities and new jobs; and hence, the emergence of the knowledge-based economy. Innovation and technology dissemination policies and strategies aim at creating proper environment for turning new thoughts, products and patterns into economic and social benefits. To achieve this goal, a solid basis of knowledge and tremendous innovative capabilities should be made available while creating favorable conditions for disseminating technology in all parts of the economy.

It is worth mentioning that the national innovation strategy should be based on the following key directions:

- Government economic and social directions for facing the coming stage
- Accumulated experience related to current and former policies especially negative aspects and failures.
- The status of science, technology and innovation in Jordan compared to their status in the other countries in the region, in particular, and in the world, in general.
- The availability of the political decision and possibility of allotting necessary allocations.
- The experiences of other countries in the field of national policies related to science, technology and innovation.
- Regional and national directions in the fields of science, technology and innovation.
- Regional and international political and social directions.

Due to the conviction of Jordan of the necessity of working hard to face the coming stage in view of the emergence of new environment and social challenges in the energy, food, and water sectors, among others, it was necessary to adopt innovative/creative methods in all priority economic sectors. It had also to guide all ministries and bodies concerned with innovation to work as a team to follow up all topics related to innovation and creativity, and pursuing work with donor programs with the aim of shifting Jordan from efficiency-based economy to innovation-based economy.

In response to the direction of the Hashemite Kingdome of Jordan towards turning its economy into an innovation-based economy, and upon directives of the National Council of Competitiveness and creativity (NCC), the Higher Council for Science and Technology prepared the national innovation strategy in collaboration with the Ministry of Planning and International Cooperation and with the support of the World Bank and the Korean Development Institute.

It has been agreed that an innovation strategy shall be set up through following the cluster method for enhancing the development of key sectors in the Jordanian economy. Focus was made on the following priority clusters:

- Medical services and pharmaceutical industry
- Information and Telecommunications technology
- Clean technologies
- Architecture and engineering services
- Education and career guidance services
- Banking and financial services

Priority of each cluster was determined based on how far the cluster is contributing to the GDP, new job opportunities created, the total number of jobs in this cluster, required educational skills, tradability (total exports and imports divided by total output of the s cluster), pioneering projects, and the influence by and on other clusters.

The national innovation strategy has a vision which is "creating a Jordanian innovation-based economy" and a mission of "disseminating the culture of innovation, research and development, development of specialized human resources, and creating a favorable business environment".

Workgroups have been formed to formulate the executive programs, activities and projects of each cluster. The workgroups achieved their mission. Their results are presented in the following summary showing the number of projects, the estimated cost of the proposed projects, to be implemented over a period of five years (2013-2017).

Summary of proposed projects and estimated cost

cluster	**Number of activities/projects**	**Estimated cost (Jordanian dinar)**
Medical services and pharmaceutical industry	14	6,670,000
Information and Telecommunications technology	6	610,000
Clean technologies	8	1,277,000
Architecture and engineering services	6	1,910,000
Education and career guidance services	12	3,000,000
Banking and financial services	6	1,020,000
Total	**52**	**14,487,000**

1- Background

Innovation-based economy is considered one of the emerging economic methods that re-formulate the traditional economy theory through consolidating knowledge, technology, leadership and creativity and dealing with them as basic foundations of the economy instead of considering them independent powers that are not affected to a large extent by politics. Economists believe that the economy growth driver in the innovation-based economies is not the accumulation of capital but innovation-based creative capabilities and that the economic growth in the innovation-based economies is the final product of knowledge.

Scientific and technological development provides tremendous chances for the development of the competitiveness of the institutions and countries and for enhancing the national potentials for achieving sustainable development. This is achieved through developing the national science and technology system and turning it gradually into a National Innovation System. The activation of science and technology system through adopting policies and strategies for implementing them, and through strengthening links between the components of this system shall lead to establishing a national innovation system that enhances competitiveness and sustainable development in the 21st century. The executive development program of the "We are all Jordan" initiative and the recommendations of its agenda for the years 2011-2013 are considered the work plan of the government and an expression of the social and economic priorities. The plan contained four themes: motivating economic sectors, development of the infrastructure that support investments, training and employment, local development and social welfare. Priority projects and programs were selected to be included in the additional capital finance plan based on the availability of certain criteria such as those projects should enjoy more motivation for economic growth being labor-intensive projects, are more ready for implementation, have branches that are distributed over different governorates of the kingdom, are contributing to the increase of the national exports, are assisting in attracting local and foreign investments, or are using more domestic inputs than imported inputs (high domestic added value).

Upon reviewing the national science and technology policy (2006-2010) it was found out that it included stated policies in various science and technology aspects and other implied policies related to technological innovation. Due to the importance of innovation especially in motivating economic growth and creating job opportunities, the government adopted preparing a national innovation policy under the title National Innovation Strategy (2013-2017). A detailed strategy shall be set up for enhancing competitiveness and innovation in the following six clusters: medical services and pharmaceutical industry, Information and telecommunications technology, banking and financial services, clean technologies, architecture and engineering services, education and career guidance services.

2. Innovation themes and their requirements

Globalization of economy in all countries, whether industrialized or emerging, has put those countries in face of a difficult option represented in the necessity of resorting to innovation for combating unemployment, preserving their industrial independence, and pursuing their innovation and innovative spirit, which are the two factors leading to economic and social success.

To achieve these goals, lots of countries, especially industrialized ones, set up policies suitable for knowledge-based economies which emerged from coherent and wide-range reforms for augmenting the role of innovation in the growth, productivity and employment.

In view of acquiring lots of confirmed evidence of the role played by innovation in the efficiency of economy, the role played by governments and states in managing the relationship between technology on the one hand and productivity, creating job opportunities, the emergence of knowledge-based economy, changing general finance trends, and development of innovation strategies on the other, was augmented. It is worth mentioning that the innovation policies and strategies and technology dissemination aim at creating the favorable conditions for turning new thoughts, products and patterns into economic and social benefits. To achieve this goal, a solid basis of knowledge and tremendous innovative capabilities should be made available while creating favorable conditions for disseminating technology in all parts of the economy.

A. The basic features of innovation and technology dissemination policies

- Making the innovation and technology dissemination policies a part and parcel of general strategy which requires:
    - Serious coordination for implementing structural reforms in products and work, capitals, and educational activities markets.
    - Awareness of the international trends of innovation, individual views and thoughts
- Enhancing the role of the authorities in assisting in:
    - The improvement of the administration of the scientific foundation through giving more flexibility to research structures and intensifying cooperation between universities and research centers on the one hand and the industry on the other.
    - Augmenting the financial support allocated for research and development and removing obstacles facing the development of market mechanisms such as risk capital which can be used in financing innovation as an alternative or a complementary source for the traditional support of research and development.
- Boosting innovation policies through:
    - Improving the techniques and mechanisms related to evaluation
    - Introducing new mechanisms for enhancing innovation and technology dissemination through encouraging PPP.
    - Removing obstacles facing international technology while making the governing rules more transparent to encourage foreigners to participate in national research programs and creating a confirmed legal formula guaranteeing the intellectual property rights.

Due to the pressures imposed by globalization, all advanced countries embarked on setting up policies aiming at boosting and improving their domestic innovative capabilities. They started to create the favorable environment for innovation through promoting high caliber manpower and making the research base more dynamic. Hence, those countries facilitated the dissemination of knowledge in the whole innovation system and they put information and technologies at the disposal of companies and agencies and streamlined cooperation among all concerned parties. These actions are predicted to lead to the growth of productivity, create wealth, job opportunities and increase industrial exports. In parallel, the following three strategic goals should be achieved respectively:

- The prevention of the immigration of the output of national research and development
- Encouraging multinationals to invest on national research and development
- Boosting links between the national innovation system and the international innovation system and benefiting from the results of research and development done in other countries.

B. The current status of innovation:

The lack of specialized policies and strategies led to the weakness of the national innovation systems due to the following:

1. Legislative and legal factor

- Scarcity of legislative and legal articles facilitating and streamlining innovation activities.
- Scarcity or lack of legal articles related to the status of the researcher (the creative/innovative researcher law)

2. Human and institutional (organizational) factor

- The absence of proper structures of transfer and distribution of innovation (evaluation structures, technical and innovation centers, innovation and industrial creativity dissemination networks, etc.)
- Weak relationship between universities and industrial companies
- Lack of enough specialized scientific and technological highly qualified experts
- Lack of freedom of movement of researchers
- Brain drain.
- Lack of marketing of the output of the scientific research
- Lack of agencies that provide financial support for innovation (banks, agencies, funds, institutions, venture capital companies, etc.)

3. The financial factor

- Weak mobilization of public capitals
- The lack of a dynamic financial and tax system encouraging research/development and innovation (low allocations for financing of research which has not reached 1% of the GDP)
- The current financial system has not adapted with innovation requirements

- Low research/development and innovation budgets in industrial companies (they have weak contributions in the total allocations of research/development and innovation compared to those of industrialized states which are estimated at 60%)

Those factors resulted in the following passive impact:

- Lack of innovation
- Low level of technology based on the number of registered patents.
- Low scientific and technological output of research centers concerning periodicals, bulletins and scientific publications.
- Low number of companies established as a result of registered patents.
- Small number of technology incubators.
- Lack or absence of specialized bodies concerned with evaluating research results (technological agencies, finance funds, risk capital companies, technical centers, etc.)

C. Innovation enhancement requirements

1. General requirements:

- Spreading awareness regarding the importance of innovation activities on all levels (schools, institutions, universities, etc)
- Designate a prize for innovation: this appreciation shall be given to inventors and innovators according to predetermined criteria by an Arab committee
- Setting up an innovation network in collaboration with local and international professional bodies with the aim of linking inventors and innovators with the investors.
- Encouraging the establishment of professional associations for innovators.

2. Requirements with legislative and legal nature

Issuance of laws related to the following:

- A law for innovation to strengthen links between research centers and universities, on the one hand, and the private sector and industry, on the other, with the aim of facilitating the transfer of technology from scientific research bodies to companies.
    - This law shall allow researchers and researching professors to appreciate the results of their own work through creating innovative companies by participating in the social capital or become members of the board of directors of companies or monitor other companies.
    - The provisions of this law shall take into consideration the researchers' movement (freedom of movement, incentives, etc.)
- A law on industrial property in scientific research: this law shall allow university researchers working on projects financed by the state to retain the industrial property right and the right to give licenses of their patented discoveries to companies.
- A law that enables concluding research/development and innovation contracts between universities, research centers, institutes and companies.
- The researcher's law

3. Requirements with institutional and organizational nature

- Providing industrial property offices with material and human resources to involve it in the process of enhancing innovation
- Adapting industrial property systems with the requirements of the industry
- Establishing specialized bodies for the appreciation of research output: those bodies shall be working in cooperation with players in the field of innovation (technologists, economists, financiers) and shall have a key role represented in financing and following up innovation projects (designing new industrial products and patterns, employment of qualified personnel in innovative projects, establishing innovative institutions, participating in the research and development programs of research bodies, etc)
- Establishing a fund for supporting industrial innovation. The fund shall be assigned, among other things, to:
    - Providing financial aids to bodies entrusted with appreciating the industrial research results, in general, and innovative research, in particular.
    - Providing financial assistance for public and private companies for developing innovation (from designing models to manufacturing them.)
    - Granting zero interest loans to companies to create proper environment for innovation development.
    - Assisting researchers (inventors and innovators) to establish their own companies.

- Creating cooperation between research centers and small and medium enterprises. This cooperation shall be focused on:
    - Cooperation with partners to find out a soft structure that suits research and technological development in the small and medium enterprises
    - Preparing innovative programs in consultation with concerned bodies
    - Employment of suitable means for transfer and dissemination of innovation in small and medium enterprises.
    - Providing enough assistance for completion of model industrial projects.
    - Getting industrial research closer to the industry through establishing research and technological innovation networks including university research teams and industrial companies teams with the aim of
- Enhancing cooperation between the industry and research centers with the aim of standardizing capabilities, and skills available in companies, university laboratories and institutions and centers.
- Encouraging technological research in priority sectors with the aim of the development of new products and services that meet the market requirements.
- Establishing business incubators to support the foundation of innovative companies.

4-Requirements with financial and tax nature:

<u>Tax procedures:</u>

Economic development and employment should have priority over imposing taxes. Thus, it is necessary to adopt a new tax system like other countries that encourages innovation on the industrial companies level such as:

- Exempting expenses of industrial companies spent on research, development and innovation from taxes

- Companies should create a reserve for technological development (1% of turnover)
- Exempting companies form taxes imposed on experts and technologists they use to assist them in research and development activities.
- Equipment, installations, chemical products, technical documents locally to be used in research and development shall be exempted customs duties and fees.
- Equipment, installations, chemical products, technical documents locally to be used in research and development shall be exempted from the value added tax.

Financial procedures:

- Increasing direct financial allocations(the state should allocate a percentage higher than 1% of its national income for research and innovation).
- Urging industrial companies to put more investments in research/development and innovation.
- Adopting new mechanisms for assisting innovators: assisting innovation projects, helping in technology transfer, supporting the employment of research in the field of innovation, etc.
- Setting aside allocations under the disposal of companies and small and medium enterprises.
- Establishing risk capital companies: it was estimated that there were about 500 risk capital funds in the USA in 1997 that invested $ 14 billion for helping emerging companies.
- Mobilizing banks to assist owners of innovation-based companies.

5-Other requirements

A-Specialized human resources

Since the past century, Jordan enjoys trained and qualified human resources in various fields in the public and private sectors. The Jordanian economy is largely dependent on the remittances of nationals working abroad. The Jordanian human resources are more distinguished from human resources of neighboring Arab countries because they are skilled, highly-trained and have high standards of professional ethics.

B-Research and development

The basic concept of innovation is linked to renovation and development so that an innovative or unique thing is produced. To achieve this, people should change the way of taking decisions and choosing from alternatives and think out of the box. Some even say that innovation changes the values on which systems are based. Therefore, innovation is a comprehensive, partial or radical change in ways of thinking, productivity, processes and institution governance. Innovation is considered in most cases the key driver of economy especially when it leads to creating new products or increasing productivity. Factors leading to innovation are very important in the decision making process.

It is well known that the research and development activities produce output that benefits the national economy. For instance, the activities of research and development can be translated into new or improved commercial, services or industrial activities with higher turnover for the national economy. Innovation resulting from research and development activities is known as the technological innovation.

It is also known that the scientific and technological activities are divided into 1) research and development 2) education and training 3) scientific and technological services. There is no doubt that innovation result from all scientific and technological activities but it is mostly the result of research and development. The education and training activities including designing and implementing educational and training programs help develop human resources, qualify and redirect them towards high value added sectors. The scientific and technological services will surely result in improving the quality of products, services, and systems and shall increase their added value.

Research and development activities are divided into: 1) basic research 2)applied research 3) development processes. Thus they have to produce new products and services that shall effectively contribute in solving problems or increase the competitiveness of the national economy and increases its growth.

In most cases, the basic research activities lead to reaching new scientific discoveries and proving or refuting scientific theories or national phenomena. This in turn leads to better understanding of nature and its different aspects which make the community deal with it in a better way and with high efficiency. For instance, our better understanding of the environment leads us to search for solutions that cause less damage to the environment and assist in sustainable development. In the meantime, the renewable energy contributes to achieving the same objective. Thus, the basic research in the field of environment and renewable energy and other sciences and branches of knowledge shall enhance our utilization of nature and shall harness nature for the benefit of human beings.

Applied research, however, mostly leads to discovering new technologies that contribute to solving certain problems, reduce certain cost, or enhances the efficacy of utilizing resources.
As for development processes, they are activities leading to raising the efficiency of available systems, reduce the waste and cost and therefore enhance efficiency of utilization which benefits the national economy a lot. Development processes also lead in several cases to increasing the added value of certain economic activities.

Scientific and technological development gives big chances for improving competiveness of institutions and states and enhances the potentials of the national sustainable development. This is achieved through developing the national science and technology system and turning it into a national innovation system.

In embodiment of the royal vision related to enhancing the role of scientific research and development in the economic and social development process in the Hashimite Kingdom of Jordan, and in view of the recommendations of “National Agenda” and “We are all Jordan” initiative related to scientific research, and in implementation of the content of “national scientific and technological policy and strategy and its executive plan for the years (2006-2010)”, which was prepared by the Higher Council for Science and Technology, and in harmony with the national strategy of Scientific Research Fund affiliated to the Ministry of Higher Education and Scientific Research and its fourth theme “Enhancing and coordinating cooperation with the Higher Council for Science and Technology”, and with the aim of boosting the current cooperation between them in the field of scientific research, the project of “setting the priorities

of scientific research in the Hashimite Kingdom of Jordan for the years 2011-2020 to draw a path for the national institutions and researchers in Jordanian universities, and research and development centers to achieve the comprehensive national development that goes in line with the scientific and technological progress was implemented.

For activating the role of scientific research and development in economic and social development, it was essential to determine the priorities of national research and development that shall be the foundation of national policies and strategies concerned with scientific, technological and innovation activities including the research and development activities and initiatives that the concerned bodies focus on. Hence, this significant national project that aims at setting sound and effective planning bases which serve the scientific research and development in Jordan.

The project dealt with different scientific sectors. Four sectoral committees were formed to cover all scientific fields, each of them comprised a number of experts, researchers and specialists. They represent different national institutions such as public and private universities, scientific centers, private sector institutions, civil society organizations, in addition to the members of the steering committee, and the members of the technical organization of the project comprising 139 researchers and specialist. Furthermore, those committees sought the help of 570 experts who filled in the questionnaires in the four rounds.

The detailed objectives of the project are as follows:

1. Specifying the scientific research priorities in different scientific and technological and innovation fields for the coming ten years.
2. Specifying maximum priority and lower priority research issues among the main topics.
3. Guiding researchers towards scientific research paths through specifying the maximum priority research issues among the key topics.

The prior specification of the priorities of scientific research and development enhances the decision making process especially when such priorities were set according to the vision of qualified experts. Therefore, such priorities are characterized by high credibility that urge researchers in research institutions and centers to adopt through preparing proposals for research projects to get support from concerned national and international parties. In this case, specifying research priorities would achieve –beside direct objectives – indirect objectives represented in increasing the intrinsic efficiency of approved legislations in the institutions, scientific and research centers and directing support and investment in the scientific research field according to the priorities specified. Thus priorities contribute to solving the national problems and will lead to pushing forward the development wheel in various fields. Thus the economic feasibility is achieved in its highest degrees when investing in and supporting scientific research especially when the scientific research met the different national requirements.

The research issues based on national priorities open the way before the scientific research centers and researchers there to get involved in teamwork with the aim of enhancing research, development and innovation and cooperate with international scientific research centers in a way that empowers scientific research and scientific knowledge. In addition, forming research and development teams comprising members of different institutions is considered a strong

indication of cooperation among such research and development institutions and production sectors resulting from this project.

Setting research priorities in the scientific, social, humanitarian, educational, cultural, media, and security sectors shall give the scientific research a holistic nature and shall strike a balance between different sectors which reflects positively on the concept of comprehensive development.

The Higher Council for Science and Technology is looking forward to make this project a first step on the road of crystallizing a comprehensive national vision for the scientific research role in enhancing holistic economic development. The council aspires to that this vision shall be a common factor for all concerned scientific and technological community and institutions and beneficiaries of social and economic sectors, and decision makers with the aim of giving impetus to the research and development priorities specified in the project.

We hope that the results of the project would specify the precise framework of national policy related to guiding the national efforts and initiative to support, finance and sponsor research and development projects in addition to allotting necessary allocations for them in a way that would achieve economic and social development in Jordan.

It is worth mentioning that this project coincided with the other national projects and initiatives including the preparation of the national policy and strategy for science, technology and innovation for the years 2013-2017 and the campaign of confronting the change drivers and challenges of the 21st century that dealt with eight development and social sectors. The survey has shown that the key challenges in Jordan was represented in three sectors which are water, energy and food which required concerted efforts and coordination of national efforts to face them to achieve sustainable development in Jordan.

The Higher Council asserted that the current challenges should be taken into account within the framework of the comprehensive paths (social, economic and environment), and national priorities of change drivers in the 21st century when setting future scientific, technological and innovative policies and strategies. The work plan which was approved included many procedures, activities and output including:

- Reviewing the experiences of a number of countries in the field of preparing science, technology and innovation policy and strategies through inviting foreign experts in those fields to visit Jordan to showcase their expertise from Lebanon and Egypt or through making visits to institutions concerned with science and technology in other countries like Turkey, Finland and Korea.
- Holding a brainstorming session in which 160 experts and specialists from concerned national institutions (government, public and private sector as well as NGOs) took part. A special questionnaire was distributed to measure the opinions of the participants regarding bases and themes of policy and strategy intended to be prepared to be used in later stages, and making a SWOT analysis for the science and technology system in Jordan, specifying the priority change drivers in Jordan. The session included three lectures for local experts and included topics related to strengths and weaknesses of the science, technology and innovation

system in Jordan and opportunities and threats surrounding science, technology and innovation system in addition to addressing the change drivers in the 21st century.

- A micro technical committee was formed by the steering committee of the project and was entrusted with writing the initial draft of the key bases and themes of national scientific and technological policy and strategy for the years 2013-2017. The mechanism of the technical committee included classifying the data collected from questionnaire into main topics related to strengths, opportunities, and threats related to the national science and technology system in Jordan. This weaknesses classification resulted in drawing 18 general strategies which were merged into 14 alternative strategies. Five detailed strategies were derived out of which five main programs for policies and strategies emanated for the years 2013-2017.
- Five teams were formed. They were entrusted with setting the general and specific targets, predicted results of each of the five programs, and projects included in those programs and specifying the key activities, timeframe, estimated cost of each of those projects for each of the following programs:
  1. Institutional framework and policies and legislations program
  2. Infrastructure and human resources program
  3. Government finance for higher educational institutions, scientific centers and science and technology environment program.
  4. Enhancing productivity and competitiveness of national economy and the support of the private sector of the activities of research and development program
  5. National innovation program

C-Business environment

Improving the business environment in Jordan is one of the key factors supporting sustainable economic development. A committee comprising representatives from different concerned ministries and entities was formed to set up a plan for improving business environment in Jordan. The items of the plan included the legal and procedural reforms related to improving the business practice environment in Jordan within a specified timeframe, through streamlining the procedures of registering and licensing projects, facilitating ownership procedures, and streamlining tax and customs procedures and others. When we address the business environment, we should specify the general framework of innovation system in Jordan which comprises the following bodies:

- Government ministries and institutions
- Private sector companies and institutions
- Educational institutions
- Research centers
- Intermediary institutions
- Banks and financial institutions
- Other supporting entities

The Jordan Economic Development Cooperation (JEDCO) started to prepare a Services Development Master Plan in 2010 through the Services Modernization Program (SMP) in Jordan. Workgroups specialized in the fields of health, medical tourism, engineering and construction, innovation and innovation-related actions, and higher education services and transportation and distribution were formed.

The Ministry of Planning and International Cooperation (MOPIC) prepares and issues Jordanian competitiveness reports periodically. They include surveys for the competitive advantages of the vital sectors of the Jordanian economy such as tourism, pharmaceuticals, medical tourism, higher education, information technology, banking, insurance, and food industries in collaboration with the private sector with the aim of adopting polices that would boost the competitiveness of the national economy with its various sectors.

The National Center for Research and Development that includes the National Program for Energy Research, the National Program for Biotechnology, the Program of Badia research and development in Jordan, the National Program for Nanotechnology, Water and Food Program, has prepared the national strategy for research and development. This strategy aims at contributing in achieving human security through augmenting water, energy, and food resources and their utilization and improving human health through technological research and development.

Innovation mostly results from interactions and interventions between parties comprising the national innovation system. The first step towards achieving national innovation is to understand the role of each of those parties, how they cooperate and coordinate their efforts to avoid wasting effort, time and funds. We can say that innovation can never see light without the effective participation of all parties as per the specialization and responsibilities of each party. The success of innovation in any country is measured by cooperation and coordination among those parties with the aim of making the innovation activities successful. The following figure shows the roles of the players in the national innovation system in Jordan as per GTZ report which was issued in 2007 under the title of Study on the innovation system in Jordan.

level		**Players**	**Role/Function**
Macro	Policies	Government institutions and decision makers	Setting up the general framework and monitoring the implementation of the innovation system
Meso	Institutional and program support	Institutions providing financial, logistical and technical support and human resources development	Designing and implementing initiatives and methods turning policies and thoughts into action on the ground
Micro	Innovative capabilities	Companies and educational and research institutions	Receiving support and production of knowledge, technology and products

It is necessary to create a favorable environment for innovation. To create such an environment the following strategies should be adopted:

1. Resorting to international models to complete the institutional structure and creating cooperation channels and joint work between the system institutions and coordinating and activating policies and legislations.
2. Making use of national companies and international networking, grants, and foreign direct investment in completing the infrastructure, upgrade installations, and training science and high technology cadres.
3. Entering into regional and international technological coalitions

4. Entering into partnerships and networking on the regional and international levels in the research and development activities.
5. Attracting foreign direct investments which use technological research and development in creating new products/services.
6. Increasing the government direct support for higher education and educational institutions and raising the awareness of the society regarding the importance of science, technology and innovation in development.
7. Employment of policies and legislations in increasing the government direct support for higher educational institutions and scientific research institutions and attracting and retaining all national efficient professionals.
8. Establishing well-equipped and advanced research and development labs
9. Introducing high technology into various development sectors.
10. Development of technologies which are still in their first phases.
11. Enhancing research component in all programs and higher education and introducing the state-of-the-art technologies into them.
12. Creating the favorable environment and physical facilities for retaining qualified national professionals.
13. Creating incentives for enhancing research and development activities and teamwork.
14. Establishing innovation clusters in various fields.

Through studying and reviewing strategies on which the workgroups agreed, which are indicated in the 14 strategies above, work teams agreed on the following five strategies:

1. Completing the institutional framework and establishing cooperation and joint work channels between the system institutions and coordination and activation of policies and legislations (international models).
2. Completing the infrastructure, enhancing installations, training human resources in the scientific and high technology fields (companies, international networks, grants, and foreign direct investments)
3. Sustainability of higher education and scientific institutions, mobilizing capabilities and attracting and retaining qualified national professionals (government support).
4. Increasing productivity and competitiveness of the private sector in the field of research and development (introducing high technology and developing technologies which are still in their first phases.)
5. Urging and supporting innovation morally and financially (innovation clusters in various fields)

Activating the science and technology system through adopting a policy and a strategy for implementing this policy, and strengthening links between components of this system, shall lead to creating a national innovation system increasing the competitiveness of the country and achieving sustainable development in the 21st century.

The development and executive program of "We are all Jordan' initiative and the recommendations of the agenda for the years 2011-2013 are considered the government action plan and a translation of the economic and social priorities. The plan comprised four components: stimulating the economic sectors, development of the infrastructure supporting investments, training and employment, local development and social well-fare. Priority programs

and projects were chosen to be included into the additional capital finance plan according to certain criteria; the projects should be more stimulating for the economic growth; they should be labor-intensive projects, ready to implement, have branches distributed on different governorates of the kingdom, contribute into increasing the volume of the national exports, assist in attracting local and foreign investments, and use more domestic components than exported ones (high domestic added value).

The priorities specified in the executive program included the importance of upgrading public transportation, enhancing support for the sectors of education, health, social development, combating poverty and enabling Jordan to launch major projects in the fields of energy, water and transportation.

The efforts of the Ministry of Planning and International Cooperation for improving the economic and investment environment through monitoring the international reports and indexes that Jordan participates in preparing, included preparing a plan for improving the ranking of Jordan on international indexes. This shall be achieved through the first joint action of its kind between the private sector and various ministries and government institutions. Upon the directives of the Prime Minister, the Ministry held a workshop in November 2012 on Jordan's ranking in international reports and indexes. The workshop was attended by 100 personalities representing the private sector institutions and various government institutions to boost cooperation and reduce the gap between the public and private sector for the national benefit. The workshop was divided into four key topics that revealed the poor performance of Jordan on international reports: business and investment environment; financial and cash policies; higher education, employment, and research and development; and education and health.

Based on those four topics, four technical committees were formed. They studied the international reports and indexes and analyzed the performance of Jordan in this regard. They also discussed the proposed actions for enhancing the competitiveness of the Jordanian economy which leads to make the ranking of Jordan higher on international indexes.

To benefit from international expertise in this field, the International Finance corporation (IFC), which prepares the business practice report, was invited to inform participants on the reasons why Jordan ranks low on the report indexes and proposing means for improving Jordan's ranking; the USAID funded SABEQ was also invited to support reform plan.

This workshop produced what has been known later as the first draft of roadmap matrix which indicted the parties concerned with indexes and the proposed actions for improving ranking and the timeframe necessary to make the actions applicable.

The matrix was distributed on participants so that each institution should review it and give its comments or recommendations that would be presented to experts and specialists to guarantee that applicability of those procedures on the Jordanian economy.

The proposed actions in the roadmap shall reflect positively on the investment and business environment in Jordan. Such actions indicated that canceling the minimum limit of capital necessary for starting up an economy activity improves and facilitates starting a business in

Jordan and stimulates establishing pioneering projects that play a special role in transforming the Jordanian economy into a knowledge-based economy that depends on innovation and creativity.

As for the registration and property ownership transfer procedures, the matrix indicated that property registration fee of 5% are applied only until the end of the year and the approval of the continuation of its application is expected to improve the ranking of Jordan according to this indicator in the coming report of business practice by 20 to 25 points. Thus the total ranking or Jordan would go up by 3 to 6 points.

The implementation of liquidation of commercial businesses should be done through reviewing and approving the bankruptcy and insolvency law and according to the international best practices and its application as soon as possible to facilitate the movement of economic resources from one activity to another. The law includes restructuring financially distressed companies through canceling articles in trade and companies laws, and clarifying the topics of default and priorities of distribution of debts as per the draft law proposed in 2009, on which consultation principles were applied by the company monitoring department; this shall lead to that the ranking of Jordan as per this index would go up in the coming report by 60 to 70 points and in turn shall make the overall ranking or Jordan go up by 15 to 20 points.

The roadmap stresses the importance of reconsidering the concept of profession licensing necessary for embarking on businesses and the concept of post inspection and amending the necessary laws and regulations through granting prior licenses for low-risk professions and investment projects and conduct inspection at a later stage. It recommends that activities and paperwork should be assessed to specify the timeframe necessary for finishing paperwork (according to each case) and abiding by it. For increasing the participation of women in manpower and economy, the matrix suggested the expansion of women micro funds and setting up mechanisms that would help in establishing companies for marketing women projects and amending the mechanisms of providing national support for the needy women in a way that would urge them to work and move from the stage of receiving donations to the stage of employment and production.

Within the context of eradicating abject poverty and hunger, the roadmap recommended the activation and development of a national strategy for combating poverty and expanding the social care and protection services, establishing a national guidance system to serve the disabled, developing a preventive program to reduce the spread of malnutrition among children and early detection of such diseases and the expansion of the project of school meals to cover 800 thousands students.

As for the procedures of employment and end of service, it was recommended that the intellectual property of companies should be protected especially companies working in the innovative production field. This will guarantee that the company can maintain property of its patent in case of ending the service of any employee.

For boosting the productivity of employees, the roadmap recommended that investments should be put in centers of excellence that would provide specialized training which is suitable for the

requirements of the private sector to improve the productivity of employees, increasing the job opportunities available, and augmenting the participation of manpower.

After taking all the recommendations and observations of concerned parties into consideration, a roadmap with a detailed timeframe was reached for improving Jordan's performance in the international reports and indexes. To guarantee the continuation of institutionalized work and as a second stage of the reform plan, the Ministry of Planning and International Cooperation got experts from IFC to set up the best methodology as per the international best practices for the implementation of the roadmap and turning it into practical steps on the ground. The IFC designated an expert in the field of international business practices to work side by side with the national team for studying competitiveness in the Ministry of Planning and International Cooperation.

In cooperation with the USAID financed SABEQ, a project for studying the Jordanian legislations using the Regulatory Guillotine was initiated with the aim of improving the investment environment in Jordan, which focuses within the first stage of the project on the following reform issues in the business environment:

- Policies governing consultations with stakeholders at the time of making a decision
- Laws and regulations of general and specialized licenses related to economic activities.
- Procedures and costs of construction permits.

The economic development team specified the reform issues and indicated the priority of each of them according of how easy it is to deal with them so as to make as much change and improvement as possible through: removing ineffective systems, streamlining several systems in a short time at a low cost (the success of this project shall lead to reducing the cost and risk of practicing commercial businesses in the national economy), improving competitiveness and investment, creating more job opportunities, and contributing to the political reform through enhancing transparency of legislative reforms.

In collaboration with the World Bank, the ministry is working on Jordan Competitive Partnership: FDI strategic Framework and Competitiveness Workshop preparation which aims at:

- The analytical studies of the competitiveness capabilities and innovation sectors which have been recently conducted in Jordan revealed that the general policy does not concentrate on a clear strategy for attracting Foreign Direct Investments. Thus, the relationship between the national development objectives (job opportunities, innovation, and growth) and the investment policy is missing. Necessary measures should be taken to achieve those objectives through (specifying the value of demand, and setting realistic objectives for investment) for boosting the competitiveness of selected sectors.
- It has been noticed that there is duplication of work conducted by various government institutions working in the field of investment and investment environment, which leads to substandard results related to encouraging investors and attracting investments to Jordan.
- The draft initiative of Jordanian competitive partnership aims at addressing those issues through the Implementation-Drive Approach, analyzing the components of economic reforms, and analyzing obstacles facing competitiveness through:

1. Assisting the Jordanian government in drafting a strategic framework for facilitating investment in the country with the aim of boosting competitiveness on the national level
2. Analyzing sectors and determining the suitable model that contains executive procedures especially in the three key sectors: tourism, information technology and renewable energy.
3. Providing an action plan for the medical tourism because there are high potentials for investing in this sector

Commercialization and marketing of innovative thoughts

Several developed and developing countries used innovation as a basis for their scientific and technological policies. For instance, the EU approved a wide range policy in 2006 and was reviewed in 2009 [1].

This strategy is focusing on demand-driven innovation. The European strategy specifies the following themes:
1) The intellectual property rights 2) standards of enhancing innovation 3) government purchasing and enhancing innovation 4) joint technological initiative 5) pioneering markets 6) the European institute for technology and innovation 7) innovation clusters 8) innovation in services 9) financing innovation.

Richard Nedis and Ethan Byler[2] explained that innovation is the ability to turn new ideas into commercial output through using new methods, products or services in a better or a faster way than competitors. Innovation cannot be regulated by laws as it is the product of the people; scientists, researchers, pioneers, employees, investors, consumers and government institutions are the innovators. Innovation is the mental state necessary for creating the more efficient knowledge-based economy.

In the USA, the innovation policy is based on the real partnership between the public and private sectors in creating innovation. While the private sector creates the economic and investment and job opportunities, and develops products, services and processes, the government is obliged to invest in the basic scientific research, human resources and infrastructure on the one hand and it is required to create the proper and favorable environment for providing legislations, facilities and grants and other effective tools. Finally, the government represents a facilitator for setting the national priorities for the 21st century.[3]

[1]Putting knowledge into practice: A broad-based innovation strategy for the EU", 2006, and "Reviewing Community innovation policy in a changing world", 2009.

[2]"Creating a National Innovation Framework", Science Progress, Richard Nedis and Ethan Byler, April 2009.
[3]"Strategy for American Innovation", President Obama's speech, 2009

The World Bank document on innovation policy [4] states that innovation is the basis of economic and social development and thus it represents a necessary requirement for the development and growth of developing countries. According to the document, innovation is based on the general conditions of the economy, governance, education and infrastructure. The document also confirms that government should specify their objectives and priority according to the level of technological excellence, and the economic activities maturity in various production sectors. It also focused on key change drivers, creating favorable atmosphere for fostering innovation, including distinguished technological centers, scientific parks, and qualified exporting zones and others. We should build a critical mass of the innovation events and initiatives as follows:

- Promoting industrial clusters
- Attracting FDI
- Establishing new infrastructure such as scientific cities, if required.

The document of the World Bank indicates an important point which is that while the High Tech might not result in creating job opportunities, profits or wealth, developing Low Tech and utilizing local knowledge might lead to achieving an economic growth and social welfare. In the meantime, using High Tech in products, services and processes might be more important than producing it. The World Bank document likens the role of the government in innovation process to the role of the farmer. The process of enhancing innovation starts with preparing the soil, which is represented in real life by education and awareness. Then, there comes the stage of nourishing the soil and making it fertile, which is represented by research, development and information; then the stage of removing the harmful weeds and other obstacles follows, which is represented by regulation and legislations. Finally, there comes the irrigation phase which is represented by financing and technical and logistic support.

It is worth mentioning that any national policy should contain main orientations forming the main framework of this policy and the key features that the decision makers want to affect in an important way the formulation and content of the policy. The main orientations related to Jordan have been derived from one or more of the following references:

- Government economic and social orientations for confronting the coming stage
- Accumulated experience from current or former policy especially negative aspects and failures.
- Comparing the level of science and technology in Jordan with that at the countries of the region or the countries of the world
- The availability of the political will and required funds
- The experience of other countries in the field of national policies for science, technology and innovation.
- The availability of the international cooperation opportunities in the field of science, technology and innovation.
- Regional and international orientations in the fields of science, technology and innovation.
- Regional and international political and economic orientations.

[4] "Innovation Policy: A Guide for Developing Countries", Jean-Eric Aubert, with contributions from Carl Dahlman, PatricDubarle, YevgenyKuznetzov, Jean-Francois Rischard, and Justine White, World Bank Document.

Upon analyzing those references, studying internal and external impacts, declared and implied policies, and consulting employees and decision makers in the science and technology community in Jordan over the past two years (2010,2011), the following orientations of science, technology and innovation have been specified:

1. Including the theme of technological innovation in the themes of science and technology policies and strategies from now on
2. Attempting to have coherence with commercial innovation and coordinating with parties interested in this respect
3. Translating the results of the technological research and development into commercial products and completing the cycle of sponsoring entrepreneurship and innovation.
4. Provision of material, logistic and technical support to guarantee the success of entrepreneurship and innovative projects resulting from scientific, technological and innovative activities.
5. Increasing the GDP by 1-2% as a result of the national plan for research and development
6. Creating the roper environment for activating the role of science, technology and innovation in the field of economic and social development to achieve the knowledge-based economy
7. Providing extensive information, data and indicators related to science and technology activities for scientific and technological innovators, policy makers, decision makers and updating them regularly and quickly.

As for innovation, it is far from reaching the critical mass in the innovation system so as to start to have impact on the economic and social development process. According to the report of the World Bank on innovation policy in Jordan[5], although the Jordanian economy managed to get over the world economic crisis impact, it reached a relative freeze stage. Therefore, innovation should play a more effective role than before because the Jordanian economy is suffering from worrying chronic problems related to energy, water, and food. The WB report criticized the concentration of innovation activities in Jordan on just one innovation type which is the technological innovation which leads to translating the innovation activities into new products; there is less concentration on technology-based businesses and there is lack of incentives for individual initiatives in the commercial or services sectors that would not be classified as a product of scientific and technological activities. The report concludes that the innovation policy in Jordan is facing the following problems:

- It is confined to technological innovation and ignoring other innovation types such as commercial, individual innovation and innovative work methods.
- It has weak impact because the policy lacks the capabilities of making the required change.
- Policies and strategies lack in activities and events that would lead to change
- It is worth mentioning that innovation and investment in innovation output is classified as follows:
    1. Market-driven investments
    2. Efficiency/quality-driven investments
    3. Talent-driven investments

[5]"A Candid Review of Jordan's Innovation Policy", World bank/Korea Team: J.F.Rischard, J.White, S.Chung, and J.S.Kim.

There is no doubt that we should not concentrate in Jordan on the first type because we do not have a large domestic market like some other countries. In this connection, we can think of some niche markets only. Therefore, we should focus on the second and third types. We can say that the third type should get more focus than the second due to our conditions in Jordan; there are more opportunities for talents and individual innovation than improving efficiency and quality.

3. Innovation system in Jordan

Anyone who follows up the innovation process in Jordan would recognize that there are several bodies concerned with innovation and each of them has its own orientations and activities within its programs and plans. The activities of those bodies interrelate and interact, creating the national innovation system.

Innovation starts during the early years of study. Therefore, the Ministry of Education, institutions affiliated to it, NGOs such as Teachers Syndicate, Private Schools Owners Association, NGOs concerned with brining up the young are all partners in implanting innovation in the new promising generation. The private sector institutions and companies providing schools with products, services and infrastructure interact with innovation system at the start up stage. In several countries, there must be an effective role for the household in complementing the role of the school in nurturing and fostering innovation and developing it during the stages of the development of the growth of children and their capabilities.

The innovation process continues through all stages of study till the students graduate from high school. Taking into consideration that topics such as the high school exams and the way students choose the topics they would study at college and how they are distributed on universities are all topics that concern innovation, we find out that things are not as easy as they might seem and they need concerted efforts. For instance, if we do not have a framework for the selection of students for the specializations in university studies, and their distribution on universities, then all efforts exerted during the school years for boosting innovation, would be in vain. This means that innovation is a continuous process and that there is mutual impact between its different phases.

The bodies in charge of innovation at the university stage are the Ministry of Higher Education, Universities, local community institutions, and production sectors that should interact and finance joint researches and studies that link the university study with the economic reality. The impact of the Higher Council of Science and Technology and researcher institutions play a strong and effective role during this phase, too.

After graduation, graduates start to look for jobs, starting a business using their own abilities and the innovation supporting environment. University graduates and those who did not manage to get a university degree, but have skills and innovative capabilities compete together. Here, we should provide care for both categories and we should not ignore one of them or concentrate on one party at the expense of the other.

Then comes the role of the government as represented by the Ministries of Industry, Trade, Agriculture, Labor, Planning and the government institutions concerned with business and production and services projects, markets, competition, export and import and other matters that are considered decisive for the destiny of emerging companies. Government fees, encouraging investments, taxes, customs duties are all topics that are related to the favorable environment for innovation.

We should not forget that the FDI represents one of the important sources of innovation. Jordanian and foreign investors, who enter the Jordanian employment market, apply new technologies and innovative methods whose spread may improve competitiveness, raising the added value of business and the national economy in Jordan in general.

We should also mention the necessity of improving the efficiency of the government bodies through including innovation and excellence in the career promotion criteria and the incentives granted to government employees. Training, qualification, annual evaluation of employees shall be included within the concept of enhancing employee's efficiency. International recognized criteria such as satisfaction of customers, speed of conducting tasks, integrity, and transparency should be used to evaluate increase of efficiency.

If we have a closer look, we will find out that the bodies concerned with innovation in Jordan, just like other countries, are hard to count and their actions, activities and impact on innovation are interlinked and divergent. Therefore, cooperation, integration and joint work should be enhanced among those institutions so as to guarantee creating a supportive and sustainable environment for innovation. This leads us to think of setting up an effective institution that plans, coordinates and guides all efforts towards sponsoring and developing innovation. It is worth mentioning that the innovation system in Jordan does not include such a necessary central institution. Therefore, the general secretariat of the Higher Council for Science and Technology is working towards establishing a National Center for Innovation (NCI) to be concerned with planning, coordination and follow up of various stages of innovation. NCI will be a one-stop information and referral hub for all activities in the country related to innovation and private sector development by coordinating national and international administrative, financial and technical services to nurture and support innovation advancement. NCI will also provide legal/regulatory advocacy and advisory services to small and medium enterprises while creating a feedback mechanism to the government to ensure best practice and transparency. All coordinating activities of the NCI will be wrapped into a robust technology platform that will combine existing data resources with the data to be collected in order to coordinate resource referrals, monitor and evaluate innovation activities and other key performance indicators reflective of economic shifts towards innovation.

4- Methodology of preparing the document

In response to the directions of the government of the Hashemite Kingdom of Jordan and the National Council for Competitiveness and Innovation which were related to turning its economy into an innovation-driven economy, the Higher Council for Science and Technology prepared the national innovation strategy in collaboration with the Ministry of Planning and International Cooperation and with the support of the World Bank and Korea Development Institute. It has been agreed that an innovation strategy shall be set up through following up the cluster method in enhancing the key sectors in the Jordanian economy.

The following priority sectors were focused on:

- Medical services and pharmaceutical industries
- Information technology and telecommunications
- Education and career guidance services
- Architecture and engineering services
- Banking and financial services
- Clean technologies

Priorities in those clusters were set according to the following points:

- Contribution of the cluster to the GDP
- The number of job opportunities created
- The total number of jobs in the cluster – required educational qualifications
- Tradability (total exports and imports of the cluster divided by the turnover of this clusters)
- Pioneering projects entrepreneurship.
- Influence of and on other clusters

There was agreement regarding the necessity of coherence between priority sectors in the national innovation strategy and the innovation clusters project implemented by the USAID. The Higher Council for Science and Technology concerted efforts and worked with teams and groups of the innovation clusters project for developing projects for the national innovation strategy. Six teams representing the six priority clusters were formed. Each team was requested to propose interventions for the clusters to be translated into projects. Those proposals should include general objectives, detailed objectives, activities, implementation timeframe, and estimated budget taking into consideration the national priorities of research and development for the coming ten years and the following five strategy programs:

- Institutional framework, policies and legislations
- Infrastructure and human resources
- Government financing for higher education and scientific research institutions.
- Productivity and competitiveness of the national economy and partnership of the private sector
- National innovation program

Gaps have been identified in each sector (cluster), priorities of proposed interventions were set and means of linking sectors together were determined to augment effectiveness, through dialogue between partners and stakeholders, which led to specifying the main objective,

secondary objectives and procedures. Specified criteria for selection of projects were approved the most important of which are: the impact of the project on the cluster itself, the impact of the project on other clusters, level/range of impact of the project, and continuation/sustainability of the project. Five key development components were stressed: a) development of commercial businesses b) obtaining capital c) favorable environment d) research and development e) investment.

The proposed interventions included activities such as improving technical quality and capabilities through introducing specialized training, obtaining international accreditation, effective participation in international events and exhibitions, establishing new associations and incubators, enhancing services and support provided to current associations, promoting pioneering projects in the field of new technologies.

5-The key orientations of the national innovation policies for the years 2013-2017

Jordan has been affected, like other world countries, with the financial crisis that hit the world in 2009. This led to the decline of the GDP that reached 6% in 2006. The technology and innovation-based exports reached 15%. Jordan became a small player after it got on top of the countries of the region in the field of innovation in the software technology.

Due to the conviction of Jordan that it should return to its status before the crisis, and the emergence of challenges in sectors such as energy, food, water, and to tackle job opportunities and other environment and social challenges, it found it necessary to depend on innovation and creativity in different priority economic sectors, directing various ministries and institutions concerned with innovation to work together as a team to follow up all topics related to innovation and creativity, and to follow their work with donors with the aim of turning Jordan from efficiency-based economy to innovation-based economy in the relevant international reports.

Surveys conducted in Jordan revealed that there are factors inherent in the Jordanian economy which shall help it turn into an innovation-based economy. The following are the reasons that would make the Jordanian economy innovation-based and a strong competitor to economies of other countries in the region:

- The economy has a large number of world class educational and training institutions
- Universities provide high quality curricular in different subjects
- The availability of skilled labor in the local market; (there are about 100000 engineers in Jordan).
- There is highly skilled Jordanian human resources working abroad (there are about half a million Jordanian citizens working abroad)
- A large percentage of the people speaks English plus the Arabic language
- It is a politically moderate country, with a tolerant society that is open to the outside world.

In the meantime, the government and the NGOs have a strong desire to enhance the economy to turn the county into the level of advanced countries scientifically and practically. This was evident through some success stories in the field of business such as the ARAMEX shipping company and Maktub and pharmacy one.

Innovation in any country depends on the number and quality of innovators in that country. It is important to distinguish between three types of innovators or three branches of innovation:

1. Science innovator, who holds a PhD degree and participates in research and development of products, technical processes and, sometimes, in new services.
2. The innovator who gathers technology, ideas and knowledge from all parts of the world and turn them into new products or services. In most cases, this innovator is a holder of a degree in design or information technology; sometimes, lots of them hold irrelevant degrees.
3. The innovator who rethinks to obtain things. This innovator is mostly holder of MBA. We might find him in a company inventing business models, commercial operations, and supply chains.

In spite of the fact that Jordan is rich in potentials and successful stories, innovation in Jordan is still weak. This was clear through the following:

- The majority of university researchers are theoretical ones and their results are not playing any commercial role
- Brain drain resulting in few scientists coming back to Jordan
- Expenditure on research and development does not exceed 0.5% of the GDP. There is also few registered patents in Jordan.
- Contracts were made with 20 researchers only compared to 3000 in Israel up to the year 2000.
- Limited number of innovation-based programs (compared to Dubai for instance)
- There are no national companies working overseas (such as Ireland and Luxemburg)

The reason behind such points of weakness is that there are customs and traditions that impede innovation and there are shortages in the innovation policies in Jordan.

In view of the above, the policies of the Jordanian government for the years of 2013-2017 can be summarized as follows:

- Setting up a new formula for a comprehensive concept of innovation in Jordan and not confining it to technological innovation and focusing on sectors that have innovative advantages.
- Drawing up a roadmap for reaching an effective economy
- Working on inculcating the culture of research and innovation in students of basic education and secondary stages so that this innovation would extend to higher education and developing the skills and potentials of students so as to be able to conduct scientific research
- Completing the national researchers' database in universities and scientific centers to achieve innovation economy which is based on knowledge.
- Enhancing the potentials of the research centers and incubators to enable them to boost innovation and commercialization results of the scientific research.
- Granting companies with patents incentive tax exemptions

- Making the Jordanian researchers aware of the importance of patents and developing a mechanism for registering them and building up national capabilities in the field of licensing, and marketing scientific output and invention patents.
- Harnessing the technological applications in various fields for urging innovation
- Strengthening links between universities and industry

6-National innovation strategy (2013-2017)

Vision

Vision

"Realizing a Jordanian innovation economy"

Mission

Mission

"Spreading the culture of innovation, research and development and developing specialized human resources and creating a favorable business environment"

Objective

Objective

"Creating sustainable economy"

7- The executive plan (programs)

National Center for Innovation (NCI) Project:

Background and justifications:

While working on the preparation of the national Innovation strategy (2013-2017), HCST and Ministry of Planning found that Jordan needs to have a specialized body to deal with all innovation affairs on the national level, considering that the Higher Council for Science and Technology deals with scientific and technological Innovation only, and not commercial or individual Innovation. Same notes were received from the technical assistance World Bank team during their support to the preparation of the National policy and the Strategy for Science, Technology and Innovation (2013-2017).

Accordingly, the General Secretariat of the Higher Council for Science and Technology submitted a request for the establishment of the National Center for Innovation (NCI), through the Ministry of Planning and International Cooperation, to the World Bank transition fund for the Middle East and North Africa, (MENA) on October 30th 2013, and to be under the umbrella of the Higher Council for Science and Technology.

General objective:

1. NCI will be a one-stop information and referral hub for all activities in the country related to innovation and private sector development by coordinating national and international administrative, financial and technical services to nurture and support innovation advancement.
2. NCI will also provide legal/regulatory advocacy and advisory services to small and medium enterprises while creating a feedback mechanism to the government to ensure best practice and transparency.
3. All coordinating activities of the NCI will be wrapped into a robust technology platform that will combine existing data resources with the data to be collected in order to coordinate resource referrals, monitor and evaluate innovation activities and other key performance indicators reflective of economic shifts towards innovation.

Specific objectives:

1. Eliminate redundancy and dispersion of efforts
2. Maximize the use of local finance and foreign investment and technical services to the private sector and the scientific and technological community,
3. Provide data and key statistics on the impact of innovation and how to measure progress and improvement in the development process in Jordan.
4. Contribute to the commercialization of the results of research and development and the work of an important and influential partnerships with the private sector,

5. Contribute to the development of the education system, and to encourage a culture of innovation and entrepreneurship.

Expected results:

1. An Information Unit (Information Unit) which will be a reference and database on Innovation that will produce statistics and data and various performance indicators for comparative studies and measurement.
2. A Referral Unit which has two tasks: 1) the link between R & D activities carried out in research institutions and higher education with the needs of the productive sectors, 2) the link between the needs of small and medium-sized enterprises and technical service providers and donors.
3. A Monitoring and Evaluation Unit that extracts information from the information unit to analyze and calculate the performance indicators and measure the success of the commercialization process of R & D results into products and services and thus to a national economy.
4. Office of Ombudsman which serves as a central hub for all the key players involved in Innovation in the public and private sectors to identify the legal and regulatory obstacles. The unit will also assess the continuity and transparency, law enforcement and finding solutions to problems that may hinder harnessing the Innovation to contribute to the development process. The Unit through the accumulated experience will provide consulting and advise to the government and the private sector in the fields of priority areas and the enabling environment for business.

Estimated cost according to implementation timeframe:

10 Million US dollar.

Follow up and evaluation responsibility:

The Higher Council for Science and Technology (HCST), Ministry of Planning and International Cooperation (MoPIC)

Education and career guidance services cluster
Project no. (1) Accreditation and Classification of Private Schools

Background and justifications:

Raising the institutional efficiency of those institutions to meet the requirements of the High Tech and information revolution and getting revenues for the state treasury.

General objective:

Distinguished private schools contributing to raising the standard of education in the country

Specific objectives:

Linking education output with innovation and excellence

Expected results:

Consistency between the education output and quality and excellence system

Key activities and implementation timeframe:

Activity	Year of Implementation
Setting up a new system for private educational institutions	**2013**
Setting up instructions for accreditation and classification	**2013**
Field visits and engineering and educational lists for around 1000 private schools.	**2014/2015**
Evaluating and accreditation of schools and classifying them into categories.	**2015**

Timeframe:
3 years
Estimated cost according to the timeframe of implementation:

Year	Cost in Dinar
2013	**20,000 Dinar**
2014	**20,000 Dinar**
2015	**15,000 Dinar**

Follow up and evaluation responsibility:
The ministry of education and educational directorates

Project no. (2)

Assessment of the professional ad vocational specializations of the local market and the development of existing study plans and creating specializations that suit the market requirements.

Background and justifications:
Creating a database that is regularly updated to reflect the reality of the labor market requirements, giving suitable focus to field applications to be used in the actual business environment in addition to the theoretical and training frameworks in the study halls.

General objective:
Meeting with the renewable requirements of the market and following up its actual development and preparing programs and curriculums reflecting that, and updating specializations, and curriculums in intermediate colleges to cope with the theoretical knowledge development and international applications.

Specific objectives:

- Linking qualifications and technical programs output to the labor market requirements
- Updating and developing theoretical and practical curriculums

Expected results:

- Creating a database that is regularly updated to reflect the reality of the requirements of the labor market.
- More qualified and trained graduates to enable them to effectively face the challenges of the labor market.
- Enhancing positive aspects, reducing negative aspects and bridging the gap between the vocational training output and the actual requirements of the labor market.
-

The key activities and the implementation timeframe:

Activity	Year of implementation
1- Studying the reality of the labor market	2013-2014
2- Providing updated data on labor market	2013-2014
3- Activating communication between colleges, labor market and graduates	2013 - ongoing
4- Communication with major projects to realize their needs and adapt to their requirements	2013 - ongoing
5- Establishing technical specialties in view of the results of the study of the actual labor market	2013- ongoing
6- Developing practical curriculums and lining them to field training for labor market.	2013- ongoing
7- Following up output resulting from the updated plans and measuring their success in creating competencies that suits the market requirements.	2013- ongoing

Timeframe:

Beginning of 2013- according to a plan and program that will continue for three years at least

Estimated cost according to implementation timeframe:

Year	Estimated cost in Dinars
2013-2014	**150,000 Dinar**
2013- ongoing	**150,000 Dinar**

Follow up and evaluation responsibility:

Ministry of Education, Ministry of Higher Education and Scientific Research, Ministry of Labor, and Ministry of Industry and Trade.

Project no. (3)

Institutionalizing innovation and entrepreneurship spirit among higher education students

Background and justifications:

- Insufficient contact and communication skills of the students
- Curriculums and educational system does not comply with the concepts and programs of entrepreneurship
- Programs and curriculums do not comply with the requirements of knowledge-based economy.
- The absence of procedures for regular review of education plans.
- The absence of an institutional framework providing for the coordination of the efforts of the concerned national institutions (Scientific Research Fund, Royal Scientific Society, Higher Council for Science and Technology, University of Jordan, Oman Chamber of Industry, Jordanian Engineers Syndicate, and the Jordanian Institution for Developing Economic Projects)

General objectives:

Development of citizenship trends, respect of the value of work, collective work spirit, initiative, entrepreneurship, innovation, self-dependence, in addition to boosting logical and critical thinking, communication, research and information technology and telecommunication skills.

Specific objectives:

1. Reform and development of plans and curriculums in cooperation with the private sector and reviewing them regularly to improve chances of employment of graduates.
2. Encouraging students to select graduation projects that represent a part of the research projects implemented inside or outside the university and stressing their contributions in them.
3. Encouraging students to implement the practical training within the framework of the research projects.
4. Encouraging the private sector to form partnerships with the higher education institutions that guarantee training opportunities for students through providing incentives and tax exemptions.
5. Encouraging the private sector to invest and participate in founding research centers of excellence and the research and development projects to benefit from their output in the development of productive institutions.

Expected results:

- Increasing the number of proposed training programs that provide specialized certificates
- All academic specializations should include the requirement of field training as a precondition for graduation
- Increasing the percentage of topics in the curriculum focusing on skills
- Increasing the number of graduation projects implemented within the framework of research projects
- Increasing the number of research projects in which students are trained

- Increasing the number of partnerships formed with private sector institutions and companies including the number of research and development projects.

Key activities	Body in charge	Timeframe				Estimated cost according to years of implementation
		2013	2014	2015	2016	Dinarr
Providing students the opportunity to get specialized certificates in various specializations such as Cisco/Oracle/Microsoft/CPA	Ministry of Higher Education Higher education institutions					50,000
Inclusion of curriculums and applications for improving the chances of student employment (field training requirement) as a precondition for graduation in app specialties with minimum 9 accredited hours while reducing theoretical study hours.	Ministry of Higher Education. Higher education Institutions.					25,000
Development of programs and topics focusing on employment skills, development of students' critical and analytical thinking and skills necessary for work market such as leadership, communication and problem solving skills, etc.	Ministry of Higher Education. Higher education Institutions.					25,000
Encouraging students to choose their graduation projects as a part of research projects implemented inside or outside university and stressing their contributions in them.	Ministry of Higher Education. Higher education Institutions.					10,000
Encouraging students to implement the practical training requirement within research projects.	Ministry of Higher Education. Higher education Institutions.					10,000
Encouraging the private sector to form partnerships with	Ministry of Higher Education					10,000

higher education institutions to guarantee chances of training for students through providing incentives and tax exemptions.	Scientific Research Fund Higher education institutions Chamber of Industry and Trade					
Encouraging the private sector to invest and participate in the establishment of research excellence centers and R&D projects to benefit from their output in developing its production institutions.	Ministry of Higher Education Scientific Research Fund Higher education institutions Chamber of Industry and Trade					25,000

Follow up and evaluation responsibility:

The Ministry of Higher Education and higher education institutions

Project no. (4)

Capacity buiding of newly appointed university instructors

Background and justifications:

The teaching staff members of the higher education institutions play an important role in qualifying human resources in various fields. In fact, there are lots of staff members in higher education institutions who did not receive methodological training regarding curriculums, teaching methods, how to run a university class, and the proper methods for the evaluation of students. Because the teaching staff members are appointed immediately after they get a higher degree in one of the various branches of science, without considering his teaching or vocational skills. Therefore, there must be an alternative program that focuses on improving the performance of the teaching staff members and developing their teaching and professional efficiency before and during their career.

Thus, academic work practice system in universities and colleges for the year 2008 was interested to address this problem; para 1 of article 7 stipulates "Requests for academic appointment shall not be approved without obtaining a license,recording the name of the applicant in the register and attending the training courses held by specialized centers in the universities and colleges; this shall be applied as of the date of the implementation of the provisions of this system"

General objective:

Enhancing the efficiency of all the full-time teaching staff, researchers, lecturers who desire to work in universities and university colleges through the activation of the licensing of practice of academic work in higher education institutions.

Specific objectives:

- Setting up professional criteria for licensing academic work in higher educational institutions.
- Forming a database for the names of those who desire to work in the academic teaching and scientific research field at universities and university colleges.
- Specifying the training requirements in view of the various fields of knowledge and specializations, humanitarian and scientific specialties and the general themes for all specialties like legislations, technology utilization and its means in university education.
- Approving the general frameworks necessary for improving the performance of the teaching staff at universities while specifying the maximum and minimum training hours in each topic.
- Working hard to find an official body (rather than universities) that grants a certificate that allows its holder to practice academic teaching as per the relevant system

Expected results:

- The university degree should not be the only criteria for joining the academic teaching or research career at universities and higher education institutions. Therefore, this will limit the number of inefficient people who might work at higher education institutions.

- Contributing to enhancing the quality of higher education which would lead to improving the output and improving the quality of graduates of Jordanian universities.
- Enhancing university teaching staff development centers through allowing such centers to benefit from the project.
- Starting to hold two training course per year;each course shall comprise two sections with a maximum of 20-25 participants in each section; one of the courses shall be held in October and the second in February each year.

Key activities and implementation timeframe:

- Asking universities to make lists containing full details about their candidates nominated for getting MA/PhD degrees
- Holding a two day national workshop comprising distinguished professors of Jordanian universities in addition to managers of teaching staff development centers with the aim of determining the professional criteria and general frameworks of training programs and the items of each component/framework of the proposed training programs.
- Forming a steering committee for the program comprising members from public and private universities; two of them, at least, should be managers of teaching staff performance development centers. The committee shall be entrusted with guiding and following up the project in general and ratifying the content of the program and certificates to be granted to graduates.
- Proposing suitable timing for each course.

Timeframe

The first stage of the project shall cover two years 2013/2014 and 2014/2015

Estimated cost according to implementation timeframe:

The estimated cost of the first year (2013/2014) of the project is about 100,000 dinar and another 100,000 dinar for the second year (2014/2015).

Follow up and evaluation responsibility:

A national center is to be established for this purpose. An independent body, like the National Center for Human Resources Development, can be charged to take this responsibility temporarily.

Project no. (5)

Training of trainers and employers on innovation skills

Background and justifications:

The vocational training programs executed by the institution within the dual system training are considered the most important programs presented by the vocational training institution. A trainee spends about 50% of the training program at worksite where he acquires the necessary skills for innovation and development. In view of consistency between the development programs and trainers' capacity building, the same training should be given to employers who are mostly slow learners or have not got professional training.

General objective:

In general, this project aims at training trainers and employers on innovation and creativity skills with the aim of sharpening their creative thinking and in turn they would be able to transfer these skills to trainees who joined programs at the vocational training institution**.**

Specific objectives:

1. Preparing a training package for training trainers and employers on innovation and creativity.
2. Training 100 male and female trainers, training officers, training coordinators, institute managers from different parts of the kingdom, on innovation and creativity skills.
3. Training 50 male and female employers from different parts of the kingdom on innovation and creativity skills

Expected results:

1. Preparing a training package for training trainers and employees on innovation and creativity skills.
2. Training a task force comprising 30 trainers, 10 from each region, to transfer their skills to others.
3. Training 100 trainers, training officers, training coordinators and institute managers.
4. Training 50 employers

Key activities and implementation timeframe:

Activity	Implementation year
Designing the training package	**2013**
Forming a task force	**2013**
Holding three workshops in the north, center and south	**2013**
Training 100 trainers, training officers, training coordinators, institute managers from the north, center and south.	**2014**
Training 50 employers from the north, center and south	**2014**

Timeframe:

2013-2014

Estimated cost according to implementation timeframe:

Year	Cost (Dinar)
2012	**20,000**
2013	**20,000**

Follow up and evaluation responsibility:

The Vocational Training Corporation, the Higher Council for Science and Technology, and the Ministry of Planning and International Cooperation.

Project no.(6)

Rehabilitation and refurbishment of workshops and laboratories of the Vocational Training Corporation

Background and justifications:

Increasing demand on development and rehabilitation of workshops of the vocational training institution through providing it with necessary advanced equipment and technology in a way that enables its trainers and trainee to innovate and have initiatives.

General objective:

This project aims in general at providing the electronic industries workshops in the branches of the vocational training institutions in the three regions, with developed and modern equipment.

Specific objectives:

1. Determining the requirements of the three electronic industries workshops in the branches of the vocational training institutions in the three regions
2. Providing the threeworkshops with modern equipment.
3. Training 20 trainers, training officers, and coordinators on using High Tech
4. Developing the training programs in the field of electronic industries that would be applied in the institution according to the requirements of the industry and employers.

Expected results:

1. Three developed workshops
2. 20 trainers/training officers/training coordinators
3. Developed training programs that suit the industry and employers requirements

Key activities and implementation timeframe:

Activity	Implementation year
Specifying workshops	**2013**
Forming technical task force to determine requirements	**2013**
Determining requirements and preparing specifications and quantities	**2013**
Purchase, fixing installations and operating them	**2014**
Training trainers, training officers and coordinators	**2014**
Developing programs and curriculums	**2014**
Training trainers	**2014**

Timeframe:

2013 -2014

Estimated cost according to implementation timeframe:

Year	Cost (Dinar)
2013	50000
2014	50000

Follow up and evaluation responsibility:

The Vocational Training Corporation, the Higher Council for Science and Technology, and the Ministry of Planning and International Cooperation.

Project no. (7)

Classification and promotional system of vocational professions

Background and justifications:

- Opening the door before A-students to escalate the technical skills ladder (specialist/technician/vocationalworker/skilled/with limited skills)
- Shortage in professional technicians
- The disequilibrium of the labor hierarchy in Jordan
- The desire of Jordanian citizens to obtain degrees

General objective:

The project generally aims at enabling practicing labor to escalate the professional ladder to the advanced vocational and technical positions as per the vocational and technical training requirements of the work and production sectors.

Specific objectives:

- Training and qualifying 100 workers to move them from a limited-skills worker to a skilled worker
- Training and qualifying 80 workers to move them from the level of a skilled graduate to first vocational worker
- Training and qualifying 60 workers to move them from the level of second vocational worker to the level of first vocational worker
- Training and qualifying 50 workers to move them from the level of first vocational workers to the level of technicians.
- Training and qualifying 25 workers from the level of technicians to the level of specialists.

Expected results:

- 100 qualified workers at the level of skilled workers
- 80 qualified workers at the level of first vocational workers
- 60 qualified workers at the level of first vocational workers
- 50 qualified workers at the level of technicians
- 25 qualified workers at the level of specialists

Key activities and implementation timeframe:

Activity	Implementation Year
Training and qualifying 100 workers to move them from a limited-skills worker to a skilled worker	**2013**
Training and qualifying 80 workers to move them from the level of a skilled graduate to first vocational worker	**2014**
Training and qualifying 60 workers to move them from the level of second vocational worker to the level of first vocational worker	**2014**
Training and qualifying 50 workers to move them from the level of	**2014**

first vocational workers to the level of technicians.	
Training and qualifying 25 workers from the level of technicians to the level of specialists.	**2014**

Timeframe:
2013 -2014

Estimated cost according to implementation timeframe:

Year	Cost (Dinar)
2013	**10,000**
2014	**20,000**
2014	**20,000**
2014	**20,000**
2014	**30,000**

Follow up and evaluation responsibility:
The Vocational Training Corporation, the Higher Council for Science and Technology, the Ministry of Planning and International Cooperation and Al Balqa for Applied Sciences

Project no. (8)
Introduction of health and vocational safety supervisor posts

Background and justifications:

- The need of industries (industry, agriculture, and services) for vocational health and safety specialist and technician
- The labor law requires industries to have vocational health and safety specialists and technicians.
- Reducing the waste in the cost of treatment of those who sustain work injuries
- Increasing the production efficiency due to reducing the hours of production disruption.

General objective:

This project generally aims at increasing the productivity efficiency of production sectors in industries (industry, agriculture, and services) through training and qualifying vocational health and safety specialists and technicians.

Specific objectives:

1. Preparing guides, brochures, and documentaries in the field of vocational health and safety.
2. Holding 12 national symposiums to make the public aware of the program of training vocational health and safety specialists and technicians.
3. Training and qualifying 100 vocational health and safety supervisors at the level of technician.
4. Training and qualifying 100 vocational health and safety supervisors at the level of specialist.

Expected results:

1. Preparing 500 guides, 1000 brochures, and 10 documentaries to be used in spreading awareness of vocational health and safety.
2. Holding 12 national symposiums to make the public aware of the program of training vocational health and safety specialists and technicians.
3. Training and qualifying 100 vocational health and safety supervisors at the level of technician.

Key activities and implementation timeframe:

Activity	Implementation year
Producing guides and documentaries to make the public aware of the importance of vocational health and safety	**2013**
Holding 12 national symposiums to make the public aware of the program of training vocational health and safety specialists and technicians.	**2013**
Training and qualifying 100 vocational health and safety supervisors at the level of technician.	**2014**
Training and qualifying 100 vocational health and safety supervisors at the level of specialist.	**2014**

Timeframe:
2013- 2014

Estimated cost according to implementation timeframe:

Year	Cost (Dinar)
2013	**10,000**
2013	**10,000**
2014	**15,000**
2014	**15,000**

Follow up and evaluation responsibility:
The vocational Training Institution, the Higher Council for Science and Technology, the Ministry of Planning and International Cooperation and Al Balqa for Applied Sciences

Project no. (9)

Devlopment of vocational schools into productive and decentralized schools

Background and justifications:

The Ministry of Education is still carrying the main responsibility of providing the budgets of those schools which is a high budget, while this kind of education is not provided by private schools. 50% of the revenue of the production of training at school is put in the treasury while the rest is used for maintenance and bonuses for employees in those schools as per the instructions of school production. As schools do not have production in its commercial sense, the volume of the revenues of the training production is small and does not allow for developing schools, performing researches, innovating a new competitive product or providing competitive services on the local level. Therefore, schools applying this system as per the instructions of the Ministry/Center have remained the same since the creation of vocational education up till now.

General objective:

Turning qualified vocational schools, as a first step, to productive vocational schools that are administratively and financially independent (as procedures and not reforms) under the supervision of the Ministry and Accountability Department and according to their regulating instructions so that services shall be provided to the local community members in the (industrial, agriculture, household economics, hotel, and tourism) fields.

Specific objectives:

The produce various objectives such as:

- Industrial education workshops (electricity, mechanics, carpentry, decoration, etc.) could be used in manufacturing furniture for the vocational and academic schools as well as other ministries and the members of local community, provide maintenance services for the vehicles of the ministry and other ministries as well as the members of the local community. This could also be the case in other industrial branches.
- Extensive utilization of the school farm in agriculture and livestock breeding.
- Utilization of the workshops of the household economics branch (cosmetics, garment production, household production) as is the case with industrial education workshops
- Utilization of the hotel suits in the vocational schools to provide training in the food production for the members of the local community.

Expected results:

The project could achieve the following results:

1. The proposed vocational schools could achieve financial and administrative independence which facilitates the purchase of production and training inputs and the sale of products, making the necessary maintenance for the workshops and equipment, etc without going into the current hassle of procedures related to certain categorized allocations and programs.
2. Increasing the revenues of the vocational schools which will benefit the school, teachers and students.
3. Assisting those schools to gradually reach the state of financial independence which shall lessen the financial burden they impose on the state budget.

4. Openness to the local community and other governmental and non-governmental institutions which would activate the PPP.
5. Increasing the available opportunities for regular students to get training as he shall be trained as part of the training course of the curriculum and within the production course of the school. Hence, he shall acquire practical experience required by the work market.
6. Providing continuous training for the members of the local community who want to study in the vocational branches in the future and get private courses or those who want to get profession practice certificate to be used in the work market.
7. Assisting students and vocational teachers to innovate through using the system of the long day/open workshops

Procedures:

To implement this project and to develop vocational schools to be innovative in the field of education, training, competitive production, and continuous development, the following procedures should be taken:

1. Selection of schools to apply the experiment in them in the three regions
2. Selection of vocational teachers after meeting the requirements (test and interview) of admission early before the beginning of the academic year.
3. Qualifying the teachers before they start their service and it is proposed that this would be done in the summer holiday for 120 training hours in technical and teaching aspects and innovation and information usage.
4. Qualifying old teachers in specific programs for the same previous objectives.
5. Encouraging qualified teachers. The new teacher should be appointed according a different grade and year from what is applied now in the civil service system
6. Qualifying a number of educational supervisors to enhance their knowledge and capabilities.
7. Extending the school day hours till 6pm. The additional hours shall be dedicated to production and school training for members of local community
8. Alleviating the teaching burden imposed on teachers through reducing teaching hours to save additional hours for training and development
9. At time of need, schools should hire part-time teachers, trainers and technicians with limited-time contracts.
10. Amending laws and legislations governing the program
11. Charging specialized committees comprising members from relevant ministry departments (vocational training, curriculums, training, supplies, financial affairs, accountability department, etc to put the final touches on the details of the project.

Key activities and implementation timeframe:

The project will include the following key activities:

- The regular school educational and training program
- Production and maintenance services for members of the local community
- Training services for irregular students and members of local community
- Selection of 5 vocational schools in each region to apply the experiment and then generalize it on the rest of the schools gradually.

Timeframe:

The project requires 3 years for testing and qualifying the proposed vocational schools workshopsand preparing the required details and instructions by relevant authorities

Estimated cost according to implementation timeframe:

500 thousand dinars for qualifying vocational schools over 3 years

Follow up and evaluation responsibility:

- Ministry of Education
- Accountability Department
- Control, Inspection and Quality Assurance Department

Project no. (10)
Enhancing learning ability of students

Background and justifications:
It is an educational package including a number of educational interactive activities aiming at enhancing the ability of children to learn and preparing them for the first grade regarding the moral, religious, emotional, social, linguistic, physical, mental, cognitive, aesthetic aspects. The project also includes programs for enhancing the role of mothers in following up their children if they could not join kindergarten so that they would catch up with their peers who are the same age group and joined kindergartens.

Project targeted category:
- Kindergarten teachers
- Children themselves
- Mothers

General objective:
Preparing a package of educational activities for children and mothers including a CD to enhance the capabilities of children to learn and qualify them for grade one and booting the role of women in assisting their children to learn.

Specific objectives:
- Developing the learning capabilities of children
- Assisting children who did not join the government or private kindergartens and make them acquire the required skills for joining grade one.
- Increasing the awareness of parents about early childhood and its importance
- Effective and positive participation in boosting the developing the growth of children through participation in the programs provided to them.
- Boosting the role of family in the development and education of their children especially in the less favored regions.

Expected results:
Enhancing the learning capabilities of children and qualifying them to join grade one from the moral, religious, emotional, social ,linguistic ,physical , mental, cognitive, and aesthetic perspectives.

Key activities and implementation timeframe:
- Organizing a competition for public and private universities for inventing educational programs that enhances the learning capabilities of children.
- The higher studies students at the educational sciences college, and Information Technology college shall prepare those programs
- Specialized educational committees shall consider those programs and decide the winning one that would be used in all kindergartens.

Timeframe:
5 years (the last quarter of each academic year)

Estimated cost according to implementation timeframe:
500 thousand Dinar divided on the five years

Follow up and evaluation responsibility:
Ministry of Education.

Project no. (11)
Local popular games for early childhood

Background and justifications:
It is a guide for educational activities that aim at boosting the early childhood programs and developing cognitive, emotional, physical, and social aspects in an attractive way and raising the awareness of the community regarding the importance of play in the process of learning and education and reviving the heritage through the popular games.
The guide includes a CD containing a number of games played by children.

Targeted categories:
- Educational institutions
- Kindergarten teachers
- Children themselves
- Parents

General objective:
Reviving the heritage through a number of popular Jordanian and Arabian games that develop different skills of children at early childhood and raising the awareness of the educational institutions of the types of popular games so as to link the children to their Arab heritage and help them to exchange experiences and get to know different cultures through games.

Specific objectives:
- Providing a chance for children to get to know cultures of various Arab countries
- Making learning and teaching more fun
- Assisting children to acquire mental, physical, social and psychological skills.

Expected results:
- Raising the awareness of the public of the importance of play in early childhood
- Boosting the positive role of the parents in the growth of their children

Timeframe:
5 years

Estimated cost according to implementation timeframe:
500,000 thousand Dinar

Follow up and evaluation responsibility:
Ministry of Education

Project no. (12)

Child right to use information technology

Background and justifications:

It is a project aiming at developing and raising the awareness of the community regarding the priority of the issue of child rights; to achieve there would be necessary networking through forming partnerships and links with NGOs and legal institutions working in the field of advocating the child rights through:

- Producing bulletins, guides, scientific studies, and holding conferences to contribute to enhancing the rights of Arab children.
- Approving certain mechanism that can be applied to enhance the children rights in Arab countries.
- Drafting the document of "criteria" of the joint Arab action in the field of approving and enhancing the child rights.
- Forming a database specifying those in charge of the implementation of programs aiming at enhancing child rights in all Arab countries.
- Producing a magazine, in the electronic and paper forms, and allowing all those who work in the field of child rights to participate in this magazine and distribute it to all relevant bodies.

Targeted categories:

- Legislators specialized in the field of family and childhood
- Societies concerned with child rights
- Legal institutions
- Educational and media institutions
- Parents and families
- Children themselves

General objective:

Producing a number of tools and mechanism that assist in raising the awareness of those in charge of educational institutions, NGOs, and legal institutions of the prescribed rights of children; they also aim at enabling them to defend such rights in a more effective way, and encouraging sharing experiences on how to work effectively, and how to turn them into applicable tasks in the public and private institutions.

Specific objectives:

- Forming an interactive network of those concerned with human right through an interactive software using the internet.
- Answering the enquiries related to child rights issues by specialists
- Enlightening the parents, teachers, and development policy makers of the necessity of putting the child rights as a priority on their agendas.
- Explaining the legislative and legal aspects of violating child rights
- Holding suitable rehabilitation and training courses for those working in the field of child rights

- Issuing a periodical bulletin addressing categories concerned with child rights. Specialists working in NGOs and legal institutions shall participate in the writing the material of the bulletin.

Expected results:

- Giving children the chance to be interviewed by media
- Participating in adopting codes of ethics by the media and private sector and reacting to the advertisements that violate child rights through using discriminatory messages or pictures.

Timeframe:

5 years

Estimated cost according to implementation timeframe:

500,000 thousand Dinar

Follow up and evaluation responsibility:

Ministry of Education

A Summary of proposed projects for the cluster of education and career guidance services

Sr.No	Project title	Estimated cost (Dinar)
1	Accreditation and Classification of Private Schools	55,000
2	Assessment of the professional ad vocational specializations of the local market and the development of existing study plans and creating specializations that suit the market requirements	300,000
3	Mainstreaming innovation and entrepreneurship spirit among higher education students	155,000
4	Capacity buiding of newly appointed university instructors	200,000
5	Training of trainers and employers on innovation skills	40,000
6	Rehabilitation and refurbishment of workshops and laboratories of the Vocational Training Corporation	100,000
7	Classification and promotional system of vocational professions	100,000
8	Introduction of health and vocational safety supervisor posts	50,000
9	Devlopment of vocational schools into productive and decentralized schools	500,000
10	Enhancing learning ability of students	500,000
11	Local popular games for early childhood	500,000
12	Child right to use information technology	500,000
	Total	**3,000,000 Dinar**

ICT cluster

Project no. (1)
Review and development of laws pertaining to intellectual property rights and polices concerned with innovation

Background and justifications:
The necessity of setting up a comprehensive legislation system that assist educational fields in stimulating innovation and creativity while implementing mechanisms related to implementation, monitoring, evaluation and accountability.

General objective:
Setting up a comprehensive legislation system that assist fields of knowledge in stimulating innovation and creativity

Specific objectives:
1. Enforcing the intellectual property laws
2. Offering tax incentives
3. Setting up policies for urging and enforcing the use of information and communication technology as a main tool in supporting and developing other sectors (diffusion of ICT).

Expected results:
1. Improvement and development of educational policies for enhancing innovation and adopting scientific and applied research practices.
2. Updating policies and plans for developing applied scientific research and using cooperation between the academic sector and private sector.

Timeframe:
Two years

Estimated cost according to implementation timeframe:
100,000 Dinar

Follow up and evaluation responsibility:
ICT companies association – production

Project no. (2)
ICT clusters' opportunities Assessment Study (regional and global)

Preparing a study and a survey for identifying trends, opportunities and work fields whether regionally or internationally in several secondary emerging sectors in the field of ICT including:

1. Innovative sectors including the electronic content and electronic games sector
2. Business process outsourcing
3. ICT fields in health, education, energy, environment, tourism and information. (ICT in verticals).

Background and justifications:

The secondary sectors mentioned above are domestic emerging sectors that are considered the most prominent players in this sector at the regional level. All the companies working in this field are still small or medium enterprises and still need guidance regarding opportunity identification and capacity building for expanding this market and creating elastic environment that encourages the absorption of new innovations, projects and companies to be created in this field.

General objective:

Developing a regional market study for identifying the local capacities of the service providers in the secondary sectors mentioned above with the aim of identifying opportunities of export and investment regionally and internationally and creating an identity for the Jordanian sectors at the regional level that would make it a model in those sectors at the regional level.

Specific objectives:

1. Creating an identity for the ICT sector in Jordan through distinguishing its pioneering secondary and emerging sectors and making them leading models in those areas in the region.
2. Identifying work opportunities and regional and international trends in those areas for directing the companies working in that field and providing proper services for developing their capacities according to identified opportunities.

Expected results:

The ability to specify challenges that impede companies from using its capacity of utilizing the identified opportunities and providing the necessary recommendations in this regard.

Timeframe:

5-6 months

Estimated cost according to implementation timeframe:

30,000 dinar

Follow up and evaluation responsibility:

ICT association – production

Project no. (3)
ICT sector and clusters' intellectual property assessment study

Preparing a study and survey for identifying and building a database for all the manufacturing ICT companies and companies possessing intellectual property rights or innovative products that can be developed to have intellectual property based on detailed criteria that would show the efficacy of those innovations and their economic feasibility and its demand in the market so that services would be provided to companies to enable them to export them and raise the value of their products and attracting investments.

Background and justifications:
The ICT sector is considered one of the innovative sectors in Jordan and its services and products are based on human resources. Over the years it proved that it contained a number of innovative services and products including intellectual property. The work cycle of the intellectual property and innovative practices are not institutionalized in the companies of the sector in a way that made them coherent with international criteria and be part of the sustainable developments of companies.

General objective:
Developing a study and a survey to define and build a database for all the ICT companies that produce and own property rights or innovative products that could be developed into intellectual property. This data base will then be the basis of identifying the capacity building programs required for the companies to promote and develop its innovative products in a way that matches the requirements of the local, regional and international market. Innovative products shall also be adopted to serve the companies in export programs and attracting investments.

Specific objectives :
1. Building an international and regional knowledge and reference database that contains all innovative products and services in the Jordanian ICT sector.
2. Boosting and developing innovative procedures and practices of the companies of the sector as one of the main factors used in developing sustainable companies and empowering them in international markets.
3. Linking the current innovative services and products to their exportability, attracting investments and raising the value of the company.

Expected results:
Encouraging the use of international practices in the field of intellectual property, innovation and creativity in the ICT sector as a main factor of the development of the companies and making them distinguished and developed in this fast growing sector.

Timeframe:
4-5 months

Estimated cost according to implementation timeframe:
30,000 dinar

Follow up and evaluation responsibility:
ICT association – production

Project no. (4)
Developing selected pilot ideas and projects for developing the innovation practices and scientific research

Development of selected ideas and projects for developing the practices of innovation and scientific research in the ICT companies for developing new intellectual property products.

Background and justifications:
Contributing to the implementation of relevant policies and building capacities in companies to be able to build practices and procedures related to intellectual property and finding regional and international solutions for promoting, and investing them and attracting new investments.

General objective:
Contributing to the implementation of relevant policies and building capacities in companies to be able to build practices and procedures related to intellectual property and finding regional and international solutions for promoting, and investing them and attracting new investments.

Specific objectives:
1. Filtering a number of companies based on certain criteria to work with them for building their capacities for the development of the required services and products.
2. Developing the operations of the development of those products and services and providing the required technical support
3. Promoting those products and services in relevant markets and creating an image for the companies and the whole sector.

Expected results:
Identifying a number of national, regional and international priorities that could be solved through innovative technological solutions.

Timeframe:
One year
Estimated cost according to implementation timeframe:
100,000 dinar
Follow up and evaluation responsibility:
ICT association – production

Project no. (5)
Establishing a fund for supporting innovative services and products and intellectual property in the ICT sector

Background and justifications:
The necessity of finding a mechanism for financial support of the requirements of the development of new practices and intellectual property products in the ICT sector which shall represent an effective sustainability that would enhance innovation in this sector.

General objective:
Finding a mechanism for the financial support of the requirements of the development of new practices and intellectual property in the ICT sector.

Specific objectives:
1. Management and development of a database for services and products of the intellectual property in the ICT sector.
2. Development of practices and authenticated references for developing the innovation procedures and intellectual property of the ICT companies.
3. Organizing capacity building programs and providing specialized certificates for developing the capacities of companies in adopting the practices of innovation and intellectual property.
4. Registering the intellectual property of the companies
5. Developing innovation products and services for commercialization
6. Valuation of the innovation and IP products

Expected results:
A fund for developing the innovative and IP services and products in the ICT sector.

Timeframe:
Two years

Estimated cost according to implementation timeframe:
250,000 dinar

Follow up and evaluation responsibility:
ICT association – production

Project no. (6)
Organizing programs and promotional and marketing campaigns for the innovation and IP services in the ICT cluster

Background and justifications:
Contributing to supporting the intellectual property products in the sector and finding proper markets for them in a way that guarantees the development of the sector and raising its share in the national economy and giving an image for the Jordanian sector as innovative and global.

General objective:
Supporting the IP products in the sector and finding proper markets for them in a way that guarantees the development of the sector and raising its share in the national economy and giving an image for the Jordanian sector as innovative and global.

Specific objectives:
1. Raising global and international awareness of the Jordanian innovative ICT sector
2. Attracting investments

Expected results:
Promoting the Jordanian products for supporting companies and opening new markets for exportation

Timeframe:
Two years

Estimated cost according to implementation timeframe:
100,000 dinar

Follow up and evaluation responsibility:
ICT association – production

Summary of the proposed projects of the ICT sector

Sr.no.	Name of the project	Estimated cost (Dinar)
1	Review and development of laws pertaining to IP rights and policies concerned with innovation	100,000
2	ICT clusters' opportunities Assessment Study (regional and global)	30,000
3	ICT sector and clusters' intellectual property assessment study	30,000
4	Developing selected pilot ideas and projects for developing the innovation practices and scientific research	100,000
5	Establishing a fund for supporting innovative services and	250,000

	products and intellectual property in the ICT sector	
6	Organizing programs and promotional and marketing campaigns for the innovation and IP services in the ICT cluster	100,000
	Total	610,000

Architecture and Engineering services cluster

Project no. (1)
Strategic plan to start and develop small engineering offices (900-1000) engineering offices

Background and justifications:
The spread of the sector led to the presence of a large number of offices providing small services which increased competition and was reflected on the quality and value of those services. This is considered the main point of weakness in the sector which includes about 900-1000 office that can join this national plan.

General objective:
Development of the sector and improving the capacities of engineering offices and enhancing their readiness in addition to developing vision and mission and promotion of those offices.

Specific objectives:
Qualifying offices through making them adopt:
1. Administrative systems and developed quality assurance to guarantee the provision of high-quality services
2. Developing the technical capacities through training on modern engineering programs and following the best international practices for promoting their services.

Expected objectives:
- Identifying and improving administrative systems of engineering offices and building their capacities for improving services.
- Mustering efforts for reaching unified concepts for reaching single vision and mission for the sector.
- Forming a committee (Ministry of Public Works and Housing, Engineers Syndicate, Engineering Offices Authority, Engineering Business Forum)
- Appointing an advisor for the plan and budget and specifying the work stages and the training requirements (TNA)
- Contacting training centers and training service providers
- Organizing awareness campaigns before training for encouraging offices to participate
- Training presentations based on the plan and duration
- Organizing awareness campaigns following the events to guarantee the implementation of the program.

Timeframe:
5-6 years

Estimated cost according to implementation timeframe:
500,000 dinar

Follow up and evaluation responsibility:

The Steering committee headed by the Ministry of Public Works and Housing and Engineering Syndicate, Engineering Offices Authority, Engineering Business Forum, Engineers Training Center and several training bodies.

Project no. (2)

A comprehensive study to asses best practices in merging engineering offices and be engaged in and to benefit from the civil companies law

Background and justifications:

With reference to project no.(1), we should notice that when the sector goes astray, it produces similar services which drove the sector away from producing world-class services. This is considered a key point of weakness in the engineering services sector. This study is important for improving and developing the services of the sector and enhancing it competitiveness and quality.

General objective:

Developing the sector, improving and building capacities of the engineering offices to achieve the mission, and vision of the sector in addition to finding the means for the sustainability of those offices.

Specific objectives:

1. Conducting a comprehensive study explaining the civil merge mechanisms.
2. Specifying the aware offices that desire to merge as a following step for the first step

Expected results:

- An awareness campaign explaining the importance and benefits of office merging
- A less number of engineering offices
- More offices working within a developed administrative system as per the best practices.

Key activities and implementation timeframe:

- A comprehensive study prepared by an advisor and a lawyer to verify the laws and regulations necessary for merging and uniting.
- Awareness campaign to be organized before and after the study

Timeframe:

The study: (4) months
Awareness campaigns: (6) months

Estimated cost according to implementation timeframe:

400000 dinar for the study to be conducted by an advisor and a lawyer in addition to sector awareness campaigns.

Follow up and evaluation responsibility:

The Engineers Syndicate, Engineering Offices Authority, and the Engineering Forum.

Project no. (3)
An annual Engineering conference under official sponsorship

Background and justifications:
The engineering sector is in need of holding an annual conference to enhance its capabilities and efficiency through getting acquainted with the latest world best practices. In addition, this conference shall also represent a chance for establishing relationships between regional and international engineering companies which will make Jordan an engineering hub in the region.

General objective:
Holding an annual event aiming at supporting the sector and networking for getting better business opportunities and promoting the engineering sector in Jordan which includes architectural and engineering innovations.

Specific objectives:
1. Capacity building and promoting best practices and innovations in the engineering sector.
2. Linking between customers, partners and investors.
3. Networking with donors and financers.

Expected results:
- More awareness of the world best practices in the sector.
- Business opportunities for the Jordanian market in the field of engineering services and establishing partnerships with regional and international companies
- Obtaining better investment opportunities through donors and financers.
- Boosting the position of Jordan as an engineering hub in the region.

Key activities and implementation timeframe:
The conference shall start in 2013 as it will need one year for preparations. Activities shall include:
1. Forming a steering committee for specifying the concerned bodies
2. Specifying topics, speakers and moderators of sessions
3. Specifying counterparts such as various companies, embassies, media
4. Specifying the sponsor and searching for supporting bodies
5. Specifying the coordinator and planner of the conference (installations company)
6. Designing and preparing media and marketing material.

Timeframe:
2-3 days

Estimated cost according to implementation timeframe:
100,000 Dinar and sponsors and supporting bodies shall be sought.

Follow up and evaluation responsibility:
The Jordanian Engineers Syndicate and the Engineering Forum

Project no. (4)

Establishing an Academic-Professional Experience- Exchange Council (APEC)

Background and justifications:

In view of the concept of innovation in the engineering sector, it has been notices that innovation essentially emanates from the development of business environment and qualifying and graduating between students. It has been agreed that the standards of graduates and the standard of presented curriculums do not suit the labor market requirements. Therefore, development of business environment and there must be innovation in the consultative engineering sector are based on linking between the theoretical and applied aspects and working on achieving the following objectives in cooperation will all relevant parties.

General objective:

Organizing the work of micro finance institutions and increasing interaction between them, increasing the interactions and cooperation between the financial lease companies and institutions in a way that makes suitable financing available for the new and current projects, enhances innovation and guarantees the continuity of proper financing.

Specific objectives:

1. Establishing an association comprising academic and vocational and representatives of the private sector to reach recommendation on development of education.
2. Bridging the gap between theory and practice
3. Providing the suitable support for meeting the requirements of the market from the academic sector related to programs, curriculums, or researchers through
    a. Modernizing university curriculums to match market requirements as per the international qualification requirements
    b. Development of the program available at universities that have an impact of the skills and efficiency of students in the field of information technology.
    c. Redesigning curriculums of engineering and architecture through providing solutions and practical models.
    d. Forming a task force to study the proposed changes of the redesigning of the study requirements in the field of architecture and engineering
4. Providing the necessary support for directing and adopting the best practices in the academic curriculums:
    a. A more specific and serious training program covering the summer semester before graduation
    b. Establishing architectural studios in the architecture colleges.
    c. Streamlining and developing of legislations in a way that supports the college programs and suits the private sector and making the graduation projects more practical and applicable as separate projects and entries in competitions.
    d. Proposing, considering and evaluating recommendations to allow university professors specialized in engineering and architecture to work in the private sector while maintain their academic program
5. Adopting an applicable national agenda which is industry and research oriented.

Expected results:
(Achieving the abovementioned goals in cooperation with relevant bodies)

Key activities and implementation timeframe:

- Specifying the relevant bodies which have to be represented in this professional academic body
- Calling for holding a consultative workshop and making sure that the relevant bodies will attend together with the follow up advisor
- Calling for the establishment of the council
- Establishing the council and preparing the strategic plan and action plan
- Appointment of a lawyer for following up the memorandum of association and the registration of the council
- Appointment of an administrative official in the council to follow up the administrative issues and implementation of the action plan.
- Holding a workshop for announcing the establishment of the council and calling for joining it

Timeframe:
The expected timeframe of the said activities in between 12 and 14 months

Estimated cost according to implementation timeframe:
60000 Jordanian Dinar for the abovementioned activities and the first establishment year including the administrative fees

Follow up and evaluation responsibility:
The National council for Competitiveness and Innovation, University representatives, Engineers Syndicate, Contractors Syndicate, and Engineering Forum.

Project no. (5)
Branding and positioning strategy for A/E

Background and justifications:

To achieve the innovation vision represented in:
(Engineering innovation cluster shall celebrate being the most innovative and creative in the region)
In view of turning Jordan to a hub in the field of engineering, and to confirm the necessity of supporting this sector through the real understanding of the position of the sector, and its potentials and enhancing the comprehension of different bodies and institutions of the role of this distinguished sector, the project is considered one of the basic steps in the field of developing innovation policy in this sector.

General objective:

Achieving the vision of innovation cluster in the engineering sector, developing an institutional branding that is in line with the potentials of the sector, developing a national system to propagate the branding of the sector and build a complementary relationships for representation, and propagating the sector among the public and private sector bodies to increase its competitiveness and providing better representation for the sector and Jordan.

Expected results:

(Achieving the above-mentioned expected goals in cooperation with relevant bodies.)

Key activities and implementation timeframe:

- Appointing an advisor to conduct the required study that shall include
- The strategy (20000 Dinar)
- Branding of the sector and communication plan (20000 Dinar)
- The implementation plan which is based on the followed means (media, training and workshops, promotion, marketing and publications (500000 – 1000000 Dinar)
- Activities are mostly based on the method of the advisor of reaching results and targets
- Brainstorming and consultation workshops with sector partners (15000 Dinar)

Timeframe:

The expected timeframe for implementing the above-mentioned activities is between 12 and 24 months

Estimated cost according to implementation timeframe:

- The strategy (20000 Dinar)
- Branding of the sector and communication plan (20000 Dinar)
- The implementation plan which is based on the followed means (media, training and workshops, promotion, marketing and publications (750,000 Dinar)
- Brainstorming and consultation workshops with sector partners (20000 Dinar)
- The division of work on the implementation years is based on the policy of the advisor.

Follow up and evaluation responsibility:

A steering committee comprising representative from: Ministry of Public Works and Housing, Jordanian Engineers Syndicate, Engineering Offices Authority, Jordanian Contractors Syndicate, Ministry of Industry and Trade, the Jordanian Institution for Developing Economic Projects, Investment Encouragement Institution, the National Council for Competitiveness and Innovation, Ministry of Higher Education, University representatives, and the Engineering Forum.

Project no. (6)

Improving the regional and global position of Jordanian A&E cluster through providing a comprehensive package of training programs, certificates, and international requirements of advances engineering consultancies (second group/200-250 engineering offices

Background and justifications:

Engineering consultancies export their services to more than 30 world countries. To assist those companies that managed to compete on the regional level to enhance their capabilities to be able to compete on the international level, they should be provided with a package of training and intentional certificates to make them more competitive and meet the requirements of the importing markets.

General objective:

Enhancing the sector and increasing its competitiveness in the regional and international markets.

Specific objectives:

- Providing a comprehensive package of training programs for advanced engineering consultancies (second group/200-250 engineering offices) to guarantee that they would acquire a technical advantage through qualifying them to use the best technical and technological practices such as (project administration package, BIM, LEED certificate for green buildings) to increase their exporting potentials and to meet the regional and international markets importing requirements.

Expected results:

(Achieving the above-mentioned goals (best practices, acquiring certificates and qualification, acquiring the qualification requirements in the region) and increasing the exporting potentials and working with engineering consultancies through signed contracts and increasing the competitiveness of Jordan.

Key activities and implementation timeframe:

- Appointing an advisor to conduct the required study that shall include (certificates, and requirements that should be included in the training needs assessment)
- Specifying the centers specialized in providing the required service
- Holding orientation workshops and inviting engineering companies to attend it (200-250 office)
- Specifying the companies interested to join and taking a pledge from them to pass the qualification phase and get the required certificate through the specified period of time
- Holding orientation workshops before the training.

Timeframe:

The expected timeframe for implementing the above-mentioned activities is between 2 and 3 years.

Estimated cost according to implementation timeframe:

The cost shall depend on the study of the advisor, needs assessment, and taking quotations from the parties providing the service. The initial estimated cost is 400000 Dinar.

Follow up and evaluation responsibility:

Engineering Forum

Summary of the proposed projects for the A&E cluster

Sr. No.	The name of the project	Estimated cost (Dinar)
1	A strategic plan to start and develop small engineering offices	500,000
2	A comprehensive study to assess best practices in merging engineering offices to be engaged in and to benefit from the civil companies law	40,000 Dinar
3	An annual engineering conference	100,000 Dinar
4	Establishing an Academic-Professional Experience-Exchange Council	60,000 Dinar
5	Branding and positioning strategy for A&E sector	810,000 Dinar
6	Improving the regional and global position of Jordanian A&E cluster through providing a comprehensive package of training programs, certificates	40,000 Dinar
	Total	**1,910,000 Dinar**

Banking and financial services cluster

Project no. (1)

Establishment of an umbrella for all entities involved in micro finance and financial leasing

Background and justifications:

In view of the increase of the micro finance institutions in Jordan and the spread of their activities in different parts of the kingdom, it might be suitable to establish an authority or an organizational umbrella for supervising the work of those institutions.

In addition, the financial leasing companies and institutions are still working without an organizational umbrella for this profession. Therefore, it might be suitable to crease such an authority.

General objective:

Organizing the work of the micro finance institutions and increasing interaction among them, increasing interaction and cooperation among financial leasing companies and institutions to guarantee providing the suitable financing for the new and current projects and to support innovation and guarantee the flow of proper financing.

Specific objectives:

1. As for the micro finance institutions, there is no law or instructions governing the work of such institutions and there is no authority supervising such work like other activities such as foreign exchange offices, and insurance. Therefore, it might be necessary to establish a regulatory and legal framework for the work of such institutions and create an authority to supervise this activity.
2. As for the financial leasing companies, there is a law governing the practices of those companies but there is no supervisory body that shall organize their work like the insurance sector or the Jordanian central bank or the bank association. Therefore, it might be suitable to create a regulatory framework for those companies that might improve their performance and publish data related to them which shall support innovation and continuation of their financing.

Expected results:

Improving the work of micro finance and financial leasing companies and organizing the work of institutions working in those two fields.

Key activities and implementation timeframe:

1. Establishing an authority that organizes the work of micro finance and financial leading companies or entrusting one of the current authorities to supervise the organization of the work of those companies.
2. Issuing the necessary legislations governing the work of micro finance companies.

Timeframe:
It is expected that the said activities shall be implemented in two years

Estimated cost according to implementation timeframe:
20,000 Dinar

Follow up and evaluation responsibility:
It might be suitable that the Ministry of planning be charged with following up the implementation of this task in cooperation with IFC and bodies concerned with issuing legislations and laws governing those institutions.

Project no. (2)

Encouraging financing of innovation through establishing a fund for loans given to innovators

Background and justifications:

Banks give loans according to their credit policies that take into consideration an acceptable level of risk and the presence of guarantees that allow the bank to recover its money. There are lots of innovative ideas, entrepreneurship projects that need financing but they do not have the required guarantees. This project provides the suitable mechanism through which the banks shall guarantee recovering their money. This would help in increasing the finance given to innovators. Banks are not parties to this fund but they are financers of the projects as per guarantees given by the fund.

General objective:

Assisting innovators to get necessary financing for implementing their innovative ideas and projects.

Specific objectives:

1. The establishment of a specialized fund for guaranteeing loans granted for innovative ideas and projects and trying to attract local and international donors that would offer loans for innovators.
2. Providing the suitable financing for innovators in Jordan with easy terms.
3. Encouraging innovative ideas in the highly required fields in Jordan.

Expected results:

1. Providing the necessary financing for innovative ideas and projects.
2. Providing the technical support, and mentoring and guidance services for owners of entrepreneurship ideas and projects.
3. Reaching suitable solutions for problems and challenges facing Jordan through encouraging innovation and creative ideas in the fields that represent a national priority.
4. The presence of a guarantee reduces the risks of loans and in return reduces their interest rate.

Key activities and implementation timeframe:

Establishing a specialized fund for guaranteeing the loans granted to innovative ideas and projects and shall perform the following:

1. Attracting local and international donors to obtaining the necessary allocations in the fund which shall form guarantees for the innovators loans.
2. Specifying the concept and fields of innovation the fund is going to support.
3. Designing a suitable mechanism for the assessment and studying the feasibility of innovative ideas and projects and selection of projects that meet the goals and requirements of the fund.
4. Providing the suitable technical support for those projects

5. Issuing a recommendation for banks to finance the projects that meet the requirements of the fund and the fund shall guarantee those loans according to certain criteria to be agreed on with banks.

Timeframe:
2012-2015

Estimated cost according to implementation timeframe:
250,000 Dinar

Follow up and evaluation responsibility:
The Higher Council for Science and Technology, the Jordanian Central Bank, Ministry of Planning and International Cooperation, and the Banks Association in Jordan.

Project no. (3)
Dedicating a best innovation finance award

Background and justifications:
inview of the efforts exerted by the Hashimite Kingdom of Jordan to encourage innovation and improve the competitiveness indicators and giving the change to any innovative idea to grow as long as it is going in the right direction and is serving the homeland, and encouraging the banking system in Jordan to achieve progress, a best innovation finance award has been dedicated. The prize shall be given to any employee in the sector or to any applicable innovative idea in the banking sector.

General objective:
Institutionalizing innovation through financial and moral incentives

Specific objectives:
1. Providing the academic, psychological, and social environment necessary for innovation, excellence, creativity and improving talents.
2. Encouraging, supporting, and enhancing applied scientific research which is aimed at developing banking and financial sector
3. Supporting excellence centers at universities in a way that copes with the strong specializations in such universities

Expected results:
Producing innovative products in the banking sector and urging creativity among bank employees

Key activities and implementation timeframe:
1. Forming a database for innovative ideas in the banking sector
2. Following up and evaluating those who provide innovative ideas
3. Forming a database containing the names the persons who provide innovative idea and the content of those ideas and publishing them on a specialized website

Timeframe:
2012-2016

Estimated cost according to implementation timeframe:
50,000

Follow up and evaluation responsibility:
The Higher Council for Science and Technology
Al Hussein Fund for Excellence and Innovation
Association of Banks in Jordan (a coordination body)

Project no. (4)

Enhancing the relationship between financial institutions and academia

Background and justifications:

Insufficient communication between the academia and banks

General objective:

Mutual benefits between financial band banking institutions on the one part and the academia on the other for enhancing innovation, efficiency, effectiveness and creativeness of both sectors

Specific objectives:

1. The output of the private sector education related to the specializations in banks and financial institutions should be relevant to the job qualifications required by those institutions. This could be achieved through relevance of curriculums, cooperation in the field of applied researches and graduation projects, providing financial, banking, and administrative training; students could receive training at banks; bank employees could give lectures to university students; bank employees could be trained by university professors;joint conferences could be held.
2. Enhancing the efficiency of bank staff and university professors through exchange of information related to the developments in the financial and banking fields (theoretical and practical)
3. Enhancing the competitiveness, good governance, and strategic planning at banks which would boost bank competiveness
4. Improving the efficiency of human resources at banks and enhancing their innovation and competitiveness through preparing suitable studies about them

Expected results:

1. Explaining the importance of banks in universities and thus developing the banking culture in the new generations which would lead to increasing demand on bank products and enhance innovation and competitiveness.
2. Supporting applied scientific research in the field of banking and supporting curriculums through serious cooperation between universities and banks within clear projects and programs.
3. Developing the banks human resources through preparing studies on bank staff specifying the volume of brain drain and putting clear indicators for following up and measuring the quality of manpower.
4. Supporting the theoretical and practical training programs thorough Banking Studies Institute and universities in collaboration with international institutions (the IMF and WB) and similar international institutions specialized in risk management, total quality management, strategic planning and adaptive leadership, in a way that enhances innovation and competitiveness of banks.
5. Banks and university professors should continue to be acquainted with the latest developments of the financial and banking sectors whether in theoretical or practical way.
6. Raising the standard of innovation and competitiveness in banks through conducting comparative studies for the variables related to international indicators of competitiveness by

a research central body (Banking Studies Institute and/or universities). Such studies should be conducted and published and banks should compete to meet their requirements.

7. Enhancing the standard of institutional control and strategic planning which will lead to enhancing innovation in banks through setting up indicators measuring bank governance and the institutional environment indicators shall represent the applied systems in bank management.
8. Enhancing excellence and innovation in the society, in general, and among students, in particular, through holding conferences at universities to showcase the Jordanian achievements in the field of entrepreneurship and distinguished projects which are financed by banks. Moreover, banks and universities should hold symposiums on innovation, its importance, and tools. They should also prepare a study on the status of innovation in Jordanian banks as regards different aspects of innovation, the application of the administrative innovation, and impediments curbing innovation in banks, as well as giving recommendations enhancing innovation in banks.

Key activities and implementation timeframe:

1. Holding joint conferences and symposiums
2. Conducting joint studies and applied researches
3. Mutual consultations for setting up academic plans related to banking sector
4. Holding training programs at universities and training students at banks (including professional certificate courses)

Timeframe:

The duration of the Innovation Strategic plan and implementation could be started since the first year

Estimated cost according to implementation timeframe:

100,000 Dinar

Follow up and evaluation responsibility:

A joint team from the Higher Council for Science and Technology, Al Hussein Fund for Excellence and Innovation, Banking Studies Institute, banks Association in Jordan (a coordination body), Ministry of Planning and International Cooperation.

Project no. (5)

Future career path

The project is based on development of graduates during their study and till it ends with the aim of assisting students in developing their skills, improving their theoretical and practical way of thinking, and benefiting from such skills after improving them to meet the requirements of institutions. They are divided into three main stages:

1. Academic qualification of graduates
2. Practical qualification of graduates
3. Graduates bank

Background and justifications:

Several institutions, although they are working in different fields, support students and train them to meet the academic requirements. There is communication between those academic bodies and institutions to assist students to get training in their specialty. This training, however, lacks in proper planning and the training path that enhances and develops students' skills.

Students need guidance during his study to assist him start his career after completing the academic stages.

Therefore, there must be incentives and motivations helping students to breed perseverance, love of study, and skill acquirement. Academic bodies and institutions play an important role in meeting requirements through providing theoretical and practical courses in their students' fields of specialization.

Those institutions that support students shall benefit a lot from careers they planned for students through appointing them in jobs that suit their theoretical and practical qualifications they acquired from the training and development program. Thus they would reduce the budget dedicated for training and job advertisements.

General objective:

1. Providing graduates a high quality development and employment program
2. Raising the standard of education in Jordan.
3. Employment of efficient graduates.

Specific objectives:

1. Sound planning for training university students and working as per plans that qualify young men, improve their skills and give them job opportunities
2. Application of a mechanism for practical training of students.
3. Increasing the support provided for students by institutions inside and outside Jordan.
4. Providing innovative skills for institutions inside and outside Jordan.
5. Guiding graduates to acquire practical experience in the right way during their study.
6. Assisting students to find job opportunities that suit their acquired qualifications.
7. Preparing a database for people with distinguished and unique qualifications and specialties.
8. Training the new generation on future planning on sound bases.

9. Assisting young men to meet public figures and successful personalities to follow their example and make future plans. This also leads to make such public figures aware of the ambitions of young men.
10. Evaluating trainees and providing job opportunities based on efficiency only
11. Saving the time and effortof banking institutions and other institutions used in selection and appointment
12. Reducing the cost of training and minimizing effort and time required by institutions at the of appointment
13. Hiring efficient students for distinguished jobs requiring highly efficient personnel.

Expected results:

1. Enhancing innovation and creativity
2. Raising the standard of educational institutions
3. Preparing a new generation capable of carrying responsibility
4. Opening new markets for graduates employment abroad
5. Improving productivity in institutions through utilizing highly efficient and innovative staff

Key activities and implementation timeframe:

1. Contracting with international companies to contribute to the project
2. Urging Jordanian universities to cooperate with higher education
3. Study of cost of all stages of the project
4. Cooperation and contracting with banking institutions and bodies in charge of training and qualification programs related to employment.

Timeframe:

Five years

Estimated cost according to implementation timeframe:

500,000

Follow up and evaluation responsibility:

The Higher Council of Science and Technology, Jordanian Universities, Ministry of Scientific Research and Higher Education, Banking Studies Institute, Banks Association of Jordan (coordination body), cooperation with national project for training and employment affiliated to the Ministry of Labour.

Project no. (6)

Enhancing entrepreneurship through working with non-profit organizations, and national initiatives concerned with this field

Background and justifications:

Entrepreneurship represents one of the key components necessary for implanting innovation and creativity especially in young men and new graduates. Creating and boosting an entrepreneurship base represents one of the strategic solutions that would lead to create a favorable environment for innovative ideas and contributing to their application. This shall be done through creating new businesses which are capable of providing sustainable job opportunities in different economic areas leading to reducing poverty and unemployment rates. During the past years, the kingdom witnessed a surge in this area as a number of non-profit organizations and national initiatives launched a package of specialized programs in the field of entrepreneurship. Then those programs targeted young men to attract innovative ideas, and provide the required support through well-considered mechanisms and comprehensive business models and turn them into profitable investment projects that are capable of attracting angel investors on the local and international levels.

General objective:

Providing support for non-profit organizations and national initiatives involved in the field of entrepreneurship.

Specific objectives:

1. Enumerating all the non-profit organizations concerned with entrepreneurship in all parts of the kingdom and evaluating their programs, efficiency, achievements, and rating them based on specific criteria.
2. Signing MOUs with non-profit organizations and pioneering national initiatives in this field
3. Providing information and financial support, care, and guidance for those who hove innovative ideas and the emerging companies
4. Contributing in the expansion of the beneficiary organizations and initiatives through the expansion of their coverage and actions
5. Achieving comprehensive development through attracting and qualifying new graduates who based their graduation projects on innovative ideas and investing in human resources and utilizing them to achieve development and progress.

Expected results:

1. Stimulating the spirit of innovation among young men
2. Increasing the number of successful emerging projects in all parts of the kingdom
3. Reducing the unemployment rate

Key activities and implementation timeframe:

Cooperation between the banking sector and non-profit organizations concerned with entrepreneurship in the kingdom

Timeframe:
2013-2016

Estimated cost according to implementation timeframe:
100,000 Dinar

Follow up and evaluation responsibility:
The Higher Council for Science and Technology, Banking Association of Jordan (coordination body)

A summary of proposed projects for the banking and financial services cluster

Sr. No.	Project name	Estimated cost (Dinar)
1	Establishment of an umbrella for all entities involved in micro finance and financial leasing	20,000
2	Encouraging financing of innovation through establishing a fund for loans given to innovators	250,000
3	Dedicating a best innovation finance award	50,000
4	Enhancing the relationship between financial institutions and academia	100,000
5	Future career path	500,000
6	Enhancing entrepreneurship through working with non-profit organizations, and national initiatives concerned with this field	100,000
	Total	**1,020,000 Dinar**

Medical services and pharmaceutical industry cluster

Project **no. (1)**

Establishing a Jordan medical biotechnology consortium

Background and justifications:

The progress of the biotechnology sector is based on the presence of close links between the industry, health care services, and the academic scientific research sector as well as a facilitating organizational environment that guarantees the safety of individuals and the effectiveness of the health care and treatment provided. The significance of creating the biotechnology cluster is represented in that this cluster guarantees that the efforts aiming at achieving the wider scale economic development objectives in the field of medical biotechnology and the presence of an organized performance-based method for developing this sector. Thus, the basic biotechnology, applied and clinical researches are not the goal in themselves, but they are the means through which Jordan can go ahead with developing the biotechnology sector to achieve economic development, create job opportunities, establish companies, increase exports and attract investments.

General objective:

Developing medical biotechnology sector and finding effective channels for coordination between universities, scientific research institutions and hospitals through establishing a Jordan medical biotechnology consortium.

Specific objectives:

Enhancing cooperation between the key institutions concerned with medical biotechnology, Universities and hospitals through mechanisms that bridge the gap between them.

Expected results:

Boosting cooperation with international projects such as USAID initiative related to supporting innovation and creativity clusters.

- Specifying the needs of the majority of institutions in this industry in Jordan
- Sponsoring the establishment of partnerships between the industry, one the one hand, and universities and hospitals on the other.
- Development of entrepreneurship and business incubators in the field of biotechnology and a fund for the development and launch of new products
- Enhancing communication with Jordanian expatriates such as biotechnology scientists and businessmen and others working on patents in the field of medical biotechnology in Jordan.
- Marketing the services and products of biotechnology institutions abroad.

Key activities and implementation timeframe:

First quarter

- Establishing and registering a Jordan medical biotechnology consortium in cooperation with the Higher Council for Sciences and Technology and King Hussein Institute for Biotechnology and Cancer.
- Forming a board of directors for the consortium comprising representatives of biotechnology institutions in Jordan and the majority of its members shall be from the field of industry.
- Specifying the administrative staff structure (specialized professional and assistant administrative officer)

Second quarter

- Setting up the action plan and monitoring its implementation
- Providing training programs for qualifying specialized manpower
- Setting up communication mechanism with Jordanian medical biotechnologists and businessmen working abroad
- Effective assistance in marketing services and products of the medical biotechnology institutions abroad

Third quarter

- Continuing to impalement the action pan
- Setting up a follow up and evaluation system

Fourth quarter

- Holding an annual international conference on medical biotechnology

Timeframe:

Full implementation during the first year

Estimated cost according to implementation timeframe:

250,000 Dinar at least

Required resources

- Two employees (a specialist and an administrative staff member) and encouraging the participating of student trainees in specific initiatives.
- The consortium's headquarters could be hosted in the Higher Council for Sciences and Technology
- The required resources for implementing the strategy, and setting up the follow up and evaluation system and holding the annual conference is 100,000 Dinar.

Follow up and evaluation responsibility:

The Higher Council for Sciences and Technology

Project no. (2)

Seeking to leverage the growing efforts in Europe and the United States to advance its regulatory science capabilities

Background and justifications:

Strengths in the field of medical biotechnology in Jordan lie in the applied sciences that are sought to cope with international developments in the field of medical biotechnology. Jordan is now performing great achievements in the clinical/pharmaceutical studies and researches which include researches related to an individual or a group of individuals or studying samples such as tissue samples taken from human beings. The progress of the pharmaceutical studies and clinical and applied researches shall help Jordan to achieve progress in the field of basic sciences and achieve tangible results in the fields of economy and public health.

General objective:

Promoting clinical and applied researches as they are the key activities including innovation and creativity and making it as a priority during the coming five years.

Specific objectives:

Development of efficient cadres in the field of organizational knowledge related to biomedicine and medical biotechnology researches

Expected results:

- Joining the Global Cooperation Group and participation in the international conference
- Standardization of technical requirements for registration of pharmaceuticals used by humans known as ICH

Key activities and implementation timeframe:

First quarter: getting information related to the requirements for joining the Global Cooperation Group to join the international conference to standardize the technical requirements for registering ICH pharmaceuticals.

Second quarter: seeking to obtain government approvals and required funding

Third quarter: applying for joining the Global Cooperation Group to participate in the international conference for standardization of technical requirements of the registration of ICH pharmaceuticals.

Fourth quarter: the international conference for standardization of technical requirements of the registration of ICH pharmaceuticals.

Timeframe:

Full implementation within one year

Estimated cost according to implementation timeframe:

Not less than 250,000 Dinar

Follow up and evaluation responsibility:
The General Organization for Food and Medicines

Project no. (3)

Developing programs for teaching regulations governing the medical sciences in Jordanian universities which includes university certificates programs and the continuous education courses for physicians and relevant government institutions cadres.

Develop Medical Regulatory Sciences Programs at Jordanian Universities

Background and justifications:

Strengths in the field of medical biotechnology in Jordan lie in the applied sciences that are sought to cope with international developments in the field of medical biotechnology. Jordan is now performing great achievements in the clinical/pharmaceutical studies and researches which include researches related to an individual or a group of individuals or studying samples such as tissue samples taken from human beings. The progress of the pharmaceutical studies and clinical and applied researches shall help Jordan to achieve progress in the field of basic sciences and achieve tangible results in the fields of economy and public health.

General objective:

Prioritizing the promotion of clinical and applied researches as they are the key activities including innovation and creativity during the coming five years.

Specific objectives:

Development of efficient cadres in the field of organizational knowledge related to biomedicine and medical biotechnology researches

Expected results:

Teaching the legislations governing medical sciences in all academic university curriculums and the continuous education courses given to physicians, pharmacists and employees of relevant government institutions.

Develop international partnerships with similar programs in renowned universities in the world in order to assist in developing curricula and educational material, professional development for the teaching staff and provide opportunities to undertake joint cooperative research project in medical legislative sciences.

Key activities and Implementation timeframe:

First 6 months:

- Forming a committee comprising representatives from faculties of pharmacy, the General Organization for Food and Medicines to consider the needs related to new educational programs.

Second 6 months:

- Reviewing the current programs
- Comparing the current programs in Jordan with similar international programs

Third 6 months:

Inviting legislative experts from international universities to discuss the emerging requirements, developments, best practices in the field of education and training in Jordan.

Fourth 6 months:

Setting up a method for evaluating Jordan and developing international partnerships with specialized bodies.

Timeframe:

Full implementation within one to two years.

Estimated cost according to implementation timeframe:

- 50,000 Dinar within the first year
- 200,000 Dinar within the second year

Required resources:

- Providing required resources and enhancing the infrastructure of faculties of pharmacy in Jordanian universities.
- The need for supporting the development of curriculums and teaching staff.

Follow up and evaluation responsibility:

The Ministry of Higher Education and Scientific Research

Project no.(4)

Creating specialized skill programs for biomedical workforce training to address the needs of groups of employers for a technically trained workforce

Background and justifications:

Talent is the essential element for developing biomedicine because the needs of biomedicine exceed the available work force of holders of MA and PhD, applied sciences specialists, technicians, MA information technology engineers, technicians, nurses and workers. While Jordan made wide strides on the road of preparing qualified cadres in relevant fields to biomedicine in recent years, there are other advanced specializations that the fields of biomedicine and biotechnology require in Jordan.

General objective:

Providing Jordan with required efficient manpower in the fields of biomedicine and biotechnology to be capable to compete in these fields on the international levels.

Specific objectives:

Development of special skills training programs targeting to provide for the industry needs in the fields of biomedicine and biotechnology.

Expected results:

- Focusing on specialized skills which are required in the fields of medical biotechnology.
- Providing the financial support for each specialized skills program especially at its initiation to enable it to have the lab equipment, training teaching staff and attracting students. As for later stage funding, it shall be obtained from the fees paid by students and contributions from the field of industry.
- Supporting every center that targets training on certain industry skill with equal amounts to that contributed by the industry whether financial or in kind contributions.

Key activities and implementation timeframe:

First 6 months: Specifying the specialized skills required by the field of medical biotechnology
Second 6 months: designing application for grants and selection criteria
Third 6 months: giving the opportunity for offering proposals/suggestions
Fourth 6 months: grant funding and launching programs

Timeframe:

Full implementation within one to two years

Estimated cost according to implementation timeframe:

1,000,000 Dinar

Required resources:

- The need for providing startup cost of each skill training program
- It is expected that skill qualification centers would generate the required funding from the industry and fees paid by students to cover its operational expenses after the startup phase.

Follow up and evaluation responsibility:

The Ministry of Higher Education and Scientific Research

Project no. (5)

Introduction of specific physician research awards in scientific centers in the health sector in Jordan.

Specific physician Scientists research awards in targeted disease areas

Background and justifications:

Strengths in the field of medical biotechnology in Jordan lie in the applied sciences that are sought to cope with international developments in the field of medical biotechnology. Jordan is now performing great achievements in the clinical/pharmaceutical studies and researches which include researches related to an individual or a group of individuals or studying samples such as tissue samples taken from human beings. The progress of the pharmaceutical studies and clinical and applied researches shall help Jordan to achieve progress in the field of basic sciences and achieve tangible results in the fields of economy and public health.

General objective:

Promotion of applied sciences as they are the key activities including innovation and creativity as a priority during the coming five years.

Specific objectives:

Providing awards for staff n the scientific centers in the health sector in Jordan:

1. Providing scholarships in the health sector in Jordan with special focus on priority targeted areas
2. Providing professional leave for physicians to follow up their research activities
3. Providing chances for career promotion for staff of health sector scientific centers in Jordan

Expected results:

- Creating new category of scientific research and development scholarships by the scientific research fund. Those scholarships should be confined to research teams working in the health sectors and the research topic should be relevant to one of the applied researches fields
- Adopting a policy that allows academic health centers and hospitals to relieve physicians of their treatment tasks and providing medical care for a period of time to be able to seek to obtain funding and to conduct their research projects.
- Providing opportunities for career promotion for researchers in scientific centers and facilitating their movement between universities and industrial institutions.
- Striking a balance between research, teaching and treatment and clinical tasks.

Key activities and implementation timeframe:

First quarter:

- Specifying the priority research topics in consultation with the Higher Health Council, Ministry of Health and medical and academic centers
- Forming a committee for studying the policies relevant to research leaves given to physicians working in medical and academic centers and hospitals.

- Forming another committee comprising experts from academic medical centers to specify the career paths for researches in each academic center.

Second quarter:

- Receiving applications for scientific research scholarshipsand forming evaluation and follow up committees
- Studying successful examples in the field of career promotions due to scientific research and others in the field of research leave and specifying the difficulties and challenges facing them.

Third quarter:

- Evaluating advanced research projects submitted for obtaining scholarships
- Preparing recommendations and outlines of policies proposed to be adopted in the future
- Specifying the educations and training programs and symposiums and subjects to be taught for qualifying researchers

Fourth quarter:

- Announcing the winning projects
- Reviewing the recommendations and policies proposed by the Jordanian Medical Council regarding the career paths and considering adopting them.
- Reviewing the recommendations and policies proposed by the Supreme Health Council sabbatical leaves and considering adopting them.

Timeframe:

Full implementation within one year

Estimated cost according to implementation timeframe:

- Using the available resources in the Scientific Research Support fund (the proposed value of the prize should be specified as per the prescribed instructions and three prizes shall be provided annually).
- Utilizing the resources available in the Higher Health Council (to cover the expenses of providing research leaves for physicians which is estimated at 25000 Dinar annually for each physicians in each medicine college in the Jordanian universities(the Jordanian university, University of Science and Technology, Mo'ta University and the Hashimite University).
- Utilizing the available resources in the academic medical centers and the medical council (to cover the expenses of studying the career paths of researches estimated at 5000 Dinar).

Follow up and evaluation responsibility:

Scientific Research Support Fund
Higher Health Council
Jordanian Medical Council

Project no. (6)

Pursue partnerships with international universities to jump-start physician researcher training programs across Jordan's academic medical centers and providing scholarships for students in the physician researcher training programs

Pursue partnerships with international universities to jump-start physician researcher training programs across Jordan's academic medical centers

Background and justifications:

Talent is the essential element for developing biomedicine because the needs of biomedicine exceed the available work force of holders of MA and PhD, applied sciences specialists, technicians, MA information technology engineers, technicians, nurses and workers. While Jordan made wide strides on the road of preparing qualified cadres in relevant fields to biomedicine in recent years, there are other advanced specializations that the fields of biomedicine and biotechnology require in Jordan. Providing efficient human resources shall accelerate creating high quality job opportunities and creating sustainable economic development in the future.

General objective:

Meeting the requirements of Jordan related to efficient human resources so as to be able to compete on the international level in the field of biomedicine.

Specific objectives:

Finding the educational programs suitable for physicians in Jordan and targeting physicians in particular due to their knowledge of medical requirements related to communicable diseases in the region and providing scholarships for students joining the Physician researcher preparation programs.

Expected results:

- Each of the four academic medical centers in Jordan (the Jordanian University, University of Science and Technology, the Hashimite University and Mo'ta University) should make a partnership with one of the international universities that applies successful training programs in the field of medical sciences, launching programs, preparing curriculums, training teaching staff, and graduating a panel of efficient Jordanian physician researchers.
- Providing the required funding for the students selected to attend the physician researchers preparation programs and encouraging them to joint those programs through financial incentives, university fees, granting humble financial allocations for research activities.

Key activities and implementation timeframe:

First 6 months:

- Specifying the world successful specialized training programs for preparing physician researchers in the medical sciences
- Communication with officials in charge of those programs to probe the possibility of their cooperation with any academic medical centers in Jordan.

- Specifying how successful training programs in the field of medical sciences could help students joining physician researchers preparations program.

Second 6 months:

- Inviting representatives of programs picked from prestigious international universities to visit Jordan and meet officials in the academic medical centers in Jordan.
- Inviting representatives of medical sciences programs of international universities to visit Jordan and consulting them on the best methods for attracting students to join physician researcher programs and how to retain them.

Third 6 months:

- Preparing MOUs specifying foundations of cooperation and signing them with selected international bodies.
- Laying down the foundations of providing financial support for students joining the physician researcher preparation program.

Fourth 6 months:

- Announcing the cooperation program and completing the final preparations for launching programs including preparing curriculums and training teaching staff.
- Announcing opening the door for submitting applications for joining training programs of physician researchers in medical sciences.

Timeframe:

Full completion within one to two years

Estimated cost according to implementation timeframe:

- 750000 Dinar for forming partnerships
- 750000 Dinar for supporting students joining the physician researcher program

Follow up and evaluation responsibility:

The Ministry of Higher Education and Scientific Research

Project no. (7)

Developing research training and entrepreneurial development courses as a component of undergraduate and graduate medical training and life science degree programs.

Background and justifications:

Talent is the essential element for developing biomedicine because the needs of biomedicine exceed the available work force of holders of MA and PhD, applied sciences specialists, technicians, MA information technology engineers, technicians, nurses and workers. While Jordan made wide strides on the road of preparing qualified cadres in relevant fields to biomedicine in recent years, there are other advanced specializations that the fields of biomedicine and biotechnology require in Jordan. Providing efficient human resources shall accelerate creating high quality job opportunities and creating sustainable economic development in the future.

General objective:

Meeting the requirements of Jordan related to efficient human resources to be able to compete on the international level in the field of biomedicine

Specific objectives:

Developing research training and undergraduate and graduate medical training and life science degree programs and holding courses for developing the initiative and research spirit.

Expected results:

Preparing and graduating students within specialized educational programs in the field of medical sciences related to biomedicine and biotechnology in Jordan so that those programs would provide data on different future career opportunities available for students. Those opportunities would include joining professions directly related to biomedicine and commercial applications of scientific discoveries and establishing commercial projects.

Key activities and implementation timeframe:

First 6 months: specifying the content of the educational programs in collaboration with scientists and industrial administrative staff and university academic scientists.
Second 6 months: approving the general framework for the content of the topics related to international universities
Third 6 months: setting up the training curriculum and study plans.
Fourth 6 months: career development of teaching staff who teach those topics and industrial representatives who provide practical application opportunities (training and job shadowing)

Timeframe:

Full implementation within one to two years

Estimated cost according to implementation timeframe:

250,000 Dinar for setting up curriculum and career development.

Follow up and evaluation responsibility:
The Ministry of Higher Education and Scientific Research

Project no. (8)
Attracting angel investors for funding emerging biomedical companies

Create a biomedical anger investor tax incentive for emerging biomedical companies

Background and justifications:
The development of the biomedicine sector requires establishing close links between industrial institutions and health care services, and academic scientific research institutions and the availability of a favorable organizational environment that guarantees the safety of human beings and effectiveness of health care and medications used. The importance of seeking to form the medical biotechnology cluster lies in that this cluster guarantees that the efforts aiming at achieving wider scale economic development objectives in the field of medical biotechnology development will not go astray. It also guarantees following a coordinated approach based on the comprehensive development of this sector. Thus, the researches of the basic biological, transitional or clinical sciences are not the goal in themselves, but they are the means through which Jordan shall go forward in the field of biological sciences in a way that would lead to economic development, create more job opportunities, establish companies, increase of exports and attract investments.

General objective:
Development of biomedicine in a way that make Jordan competitive with other countries in this field.

Specific objectives:
Establishment or funding of emerging medical biology companies and development of their exports.

Expected results:
Setting up incentives and mechanisms for the benefits of the development of the sector to make Jordan competitive with other countries.

Key activities and implementation timeframe:
First 6 months: The Ministry of Finance shall create a mechanism for the funding programs and shall grant tax incentives for angel investors in consultation with the Jordan Medical Biotechnology Consortium.
Second 6 months: Making amendments for the laws applied in this connection and seeking to pass such amendments.
Third 6 months: Preparing instructions and measures needed for the program.
Fourth 6 months: Launching the program.

Timeframe:
Full implementation within one to two years.

Estimated cost according to implementation timeframe:

1 million Dinar divided on two years.

Follow up and evaluation responsibility:

The Ministry of Finance.

Project no. (9)

Restructuring an existing financing fund or establishing a new fund for financing the development of biomedical technology in Jordan.

Restructure an existing financing fund or establish a dedicated fund to finance new product development and product and service launching by existing and emerging biomedical companies in Jordan.

Background and justifications:

The development of the biomedicine sector requires establishing close links between industrial institutions and health care services, and academic scientific research institutions and the availability of a favorable organizational environment that guarantees the safety of human beings and effectiveness of health care and medications used. The importance of seeking to form the medical biotechnology cluster lies in that this cluster guarantees that the efforts aiming at achieving wider scale economic development objectives in the field of medical biotechnology development will not go astray. It also guarantees following a coordinated approach based on the comprehensive development of this sector. Thus, the researches of the basic biological, transitional or clinical sciences are not the goal in themselves, but they are the means through which Jordan shall go forward in the field of biological sciences in a way that would lead to economic development, create more job opportunities, establish companies, increase of exports and attract investments.

General objective:

Financing the development of new products and launching products and services by the existing or the under construction medical biotechnology companies in Jordan.

Specific objectives:

Assisting the existing and new medical technology companies to get the required capital for encouraging innovation and creativity either through a fund which is capable of providing the required capital and costs related to protection of intellectual property rights or any other forms of easy financing available for supporting the activities of the development of new products and services.

Expected results:

The Investment in various aspects of biomedicine and biotechnology and the development of new products and manufacturing them.

Key activities and implementation timeframe:

First year: The establishment of a product development fund in cooperation with the Jordanian Institution for the Development of Economic Projects and Jordan medical biotechnology consortium.

Second year: Providing the required funding.

Third year:

- Appointment of administrative staff

- Setting up procedures and preparing applications for funding requests.
- Launching the fund services

Timeframe:
Full implementation within two years.

Estimated cost according to implementation timeframe:
More than one million Dinar

Follow up and evaluation responsibility:
The Jordanian Institution for the Development of Economic Projects

Project no. (10)

Providing opportunities for interaction among researches regarding cultural, ethical and religious aspects of new developments in the field of medical biotechnology.

Provide opportunities for dialogue between researchers, developers and different groups in the community to consider culture, ethical and spiritual issues related to advances in medical biotechnology.

Background and justifications:

The development of the biomedicine sector requires establishing close links between industrial institutions and health care services, and academic scientific research institutions and the availability of a favorable organizational environment that guarantees the safety of human beings and effectiveness of health care and medications used. The importance of seeking to form the medical biotechnology cluster lies in that this cluster guarantees that the efforts aiming at achieving wider scale economic development objectives in the field of medical biotechnology development will not go astray. It also guarantees following a coordinated approach based on the comprehensive development of this sector. Thus, the researches of the basic biological, transitional or clinical sciences are not the goal in themselves, but they are the means through which Jordan shall go forward in the field of biological sciences in a way that would lead to economic development, create more job opportunities, establish companies, increase of exports and attract investments.

General objective:

Creating opportunities for dialogue and interaction in the new developments and issues in the field of medical biotechnology.

Specific objectives:

Spreading public awareness on medical biotechnology sector and its importance in achieving scientific and technological development and contributing to economic development.

Expected results:

- Encouraging dialogue between concerned parties in the society on medical biotechnology issues and new relevant developments in Jordan.
- Increasing the number of participants in the activities of the National Bioethics Committee in Jordan.

Key activities and implementation timeframe:

- Holding and supporting training courses in schools and Universities.
- Holding an annual national conference of encouraging dialogue among concerned parties in the society on medical biotechnology issues and new relevant developments.

Timeframe:

Direct implementation as it is considered one of the continuous activities

Estimated cost according to implementation timeframe:
20,000 Dinar

Follow up and evaluation responsibility:
The National Bioethics Committee in Jordan.

Project no. (11)

Development of a legislative master plan for biomedicine

Development of a master plan for biomedicines

Background and justifications:

Strengths in the field of medical biotechnology in Jordan lie in the applied sciences that are sought to cope with international developments in the field of medical biotechnology. Jordan is now performing great achievements in the clinical/pharmaceutical studies and researches which include researches related to an individual or a group of individuals or studying samples such as tissue samples taken from human beings. The progress of the pharmaceutical studies and clinical and applied researches shall help Jordan to achieve progress in the field of basic sciences and achieve tangible results in the fields of economy and public health.

General objective:

Development of medicines and generic pharmaceuticals through setting up the required legislations.

Specific objectives:

Forming and developing efficiencies in the field of legislations related to biomedicine and medical biotechnology researches and reviewing and amending relevant existing laws and legislations.

Expected results:

Launching a legislative system related to generic pharmaceuticals.

Key activities and implementation timeframe:

First six months:

- The food and medicine institution shall form a committee comprising experts and industrial representatives.
- Preparing the terms of reference related to getting the support of experts in setting up legislations related to generic pharmaceuticals, and specifying tasks required form them with the aim of providing technical support for the development of projects.

The second quarter:

- Studying successful examples in this field whether in Jordan or any other countries.
- Studying difficulties and challenges.

The third quarter:

- Preparing proposals and outlines of policies recommend to be adopted in the future.

The fourth quarter:

- Reviewing the recommendations and proposed policies by the Global Health Council
- Adopting agreed recommendations and policies.

Timeframe:

Full implementation within one year

Estimated cost according to implementation timeframe:
20,000 Dinar

Follow up and evaluation responsibility:
The Global Health Council

Project no. (12)

Designing and developing of compounds thwarting heat shock protein and Hsp90 compounds for treating different types of cancer.

Design and development of compounds as a cure for cancer

Background and justifications:

Hsp90 is considered one of the proteins produced in large quantities inside the animal cell. It plays an important role in the growth of cancerous cells, their development and multiplication. Several published scientific researches revealed that thwarting this protein helps a lot in halting the growth of cancerous cells especially through thwarting EGFR receptors which are produced in large quantities in side cancerous cells. Thwarting Hsp90 leads to the death of increasing number of apoptosis cells which reduces the chances of the survival of cancerous cells. In spite of the fact that discovered compounds are very effective, but they need their chemical property to be probed through affecting chemical change in the compound structure to increase their effectiveness, and safety and to reduce their toxicity.

General objective:

Producing heat shock protein inhibitors from recently discovered compounds and making the required chemical changes related to molecular modeling with the aim of increasing their effectiveness, and safety in treating various types of cancer.

Specific objectives:

- Designing and developing Hsp90 inhibitors that have a strong effect on the cancer protein and cell and the animal (this shall include human beings)
- Designing and developing safe and low toxic Hsp90 inhibitors.

Expected results:

Obtaining highly effective, and safe Hsp90 inhibitors that could be clinically used in the treatment of cancer.

Key activities and implementation timeframe:

1. Using chemical change for manufacturing and developing Hsp90 inhibitors that are related to molecular modeling (12 months)
2. Coinciding with the first point, the effectiveness of each compound manufactured shall be studies and results shall be used in redirecting manufacturing efforts.
3. Studying the effectiveness of manufactured compounds on the cancerous cells using MTT assay (6 months)
4. The study of the effectiveness of manufactured compounds at the level of laboratory animals and in vivo Xenograft model (6 months)
5. Study of the toxicity of the effective compounds at the level of animals and in vivo model(6 months)
6. Developing of an effective way of delivering medicines with the aim of achieving a bioavailability and metabolism of targeted compounds (6 months)

Timeframe:
36 months

Estimated cost according to implementation timeframe:
60,000 Jordanian Dinar

Follow up and evaluation responsibility:
Research bodies (the Jordanian University)
The National Center for Research and Development- biotechnology program

Project no. (13)

Design and development of sustainable methods for delivering of Chitosan derivatives.

Design and development of sustainable methods to deliver medications

Background and justifications:

Highly insolvent medications are characterized by being decomposed in the digestive system which reduces the duration of their presence in the blood and makes it incumbent to give them repeatedly to patients. Developing effective methods for the delivery of that sort of medications is considered a tough test for several researchers and pharmaceutical companies.

The structure of Chitosan contains a chemical components that can be used to link some other smaller components with different physical and chemical property which makes Chitosan an excellent transmitant of highly insolvent medications.

General objective:

Developing and manufacturing effective transimitants of highly insolvent medications through changing the physical and chemical property of Chitosan Polymer.

Specific objectives:

- Increasing the chemical stability of medications that can be broken down by the secretions of the digestive system especially the stomach.
- Transmitting the medication in a continuous way which reduces the frequency of giving medication to patients
- Enhancing the absorption of medicine and its presence in the blood.

Expected results:

- Delivery of medicine in an effective and safe way to the patient
- Reducing the dosage of medicines needed by the patient leading to reducing the cost of medicines carried by the patient and manufacturing companies.

Key activities and implementation timeframe:

1. Using chemical change to manufacture and develop Chitosan derivatives (4months)
2. Diagnosis and description of manufactured particles using different methods of analysis (3 months)
3. The study of the ability of particles of delivery of medicine in a regular and persistent way in different acidic milieus (3 months)
4. The study of the effectiveness of manufactured particles of delivery of medicine to cells (4 months)
5. The study of the manufactured particles of the delivery of medicine and testing it on lab animals to assess the rate of absorption and distribution and the targeted duration of effectiveness (6 months)
6. The study of the toxicity of manufactured particles and testing them in the lab and on animals (4 months)

Timeframe:
24 months

Estimated cost according to implementation timeframe:
40,000 Dinar

Follow up and evaluation responsibility:
Research organizations (Jordan University)
The National Center for Research and Development – biological technology program.

Project no. (14)

Establishing a central medical waste disposal station at the private hospitals administrations

Establishing a central medical waste disposal station

Background and justifications:

Medical waste and disposing of them is considered one of the challenges faced by the health sector in view of the current high cost of waste disposal, and the incessant increase in the volume of medical waste due to the increase of population of Jordan and the increase of the number of non-Jordanian patients who come to the kingdom for treatment. The volume of medical waste also increases due to the increase of the number of institutions providing medical services. There is a main incinerator in King Abdullah University Hospital in Irbid and small incinerators in private sectors which operational difficulties for environmental reasons. The Ministry of Environment tried to establish a central incinerator in Ghabawi region with Jordanian-Italian investments but this project did not see the light.

In view of the objective of the private hospitals association related to preserving the environment and due to the harmful gases emitted by incinerators, the association is seeking to establish a central sterilization plant (using sterilization not incineration) in Amman to meet the requirements of hospitals in the capital and adjacent regions to sterilize medical waste and to abide by the domestic environment criteria.

General objective:

- Boosting the role of private hospitals association and its members in serving the society and preserving the environment.
- Enhancing the operational and competitive capabilities of private hospitals.

Specific objectives:

- Preserving the environment through the treatment of medical waste disposed by hospitals through sterilization and not incineration which produces gases harming the environment.
- Reducing the cost of sterilization of medical waste included by hospitals to enhance their competitive capabilities on the domestic and international levels.
- Increasing the revenues of the association through attracting investments not just membership fees.

Expected results:

- Reducing the effect of medical waste disposed by hospitals, medical centers, labs, clinics, and incinerators on the environment by 50%. The reduction would increase by 10% annually since the operation date.
- Reducing the operational cost of private hospitals by 30% to be increased by 10% annually since the operation date.
- Increasing the financial resources of the association and guaranteeing its financial sustainability to provide distinguished services for private hospitals.

Key activities and implementation timeframe:

- Charging a consultative company to prepare a feasibility study for the project – 3 months.
- Charging a legal advisor of setting up an internal system and association of a joint stock company for the administration of the project – 3 months.
- Allocating a piece of land in east Amman for establishing a sterilization plant with the participation of the Jordanian government – 3 months
- Construction, installations and equipment – 12 months

Timeframe:

One and a half years

Estimated cost according to implementation timeframe:

The cost of the project is estimated at about one million Dinar excluding the cost of the land.

Follow up and evaluation responsibility:

The private hospitals association (and the company it shall found)

A summary of the proposed projects in the medical services and pharmaceutical industries cluster

Sr. no.	Name of the project	The estimated cost
1	Establishing a Jordan medical biotechnology consortium	250,000
2	seeking to leverage the growing efforts in Europe and the United States to advance its regulatory science capabilities	250,000
3	Developing programs for teaching regulations governing the medical sciences in Jordanian universities which includes university certificates programs and the continuous education courses for physicians and relevant government institutions cadres.	250,000
4	Creating specialized skill programs for biomedical workforce training to address the needs of groups of employers for a technically trained workforce	1,000,000
5	Introduction of specific physician research awards in scientific centers in the health sector in Jordan.	30,000
6	Pursue partnerships with international universities to jump-start physician researcher training programs across Jordan's academic medical centers and providing scholarships for students in the physician researcher training	1,500,000

	programs	
7	Developing research training and entrepreneurial development courses as a component of undergraduate and graduate medical training and life science degree programs.	250,000
8	Attracting angel investors for funding emerging biomedical companies	1,000,000
9	Restructuring an existing financing fund or establishing a new fund for financing the development of biomedical technology in Jordan.	1,000,000
10	Providing opportunities for interaction among researches regarding cultural, ethical and religious aspects of new developments in the field of medical biotechnology.	20,000
11	Development of a legislative master plan for biomedicine	20,000
12	Designing and developing of compounds thwarting heat shock protein and Hsp90 compounds for treating different types of cancer.	60,000
13	Design and development of sustainable methods for delivering of Chitosan derivatives.	40,000
14	Establishing a central medical waste disposal station at the private hospitals administrations	1,000,000
	Total	**6,670,000**

Clean technology cluster

Project no. (1)

The impact of the utilization of Nanoclay on the germination of the barley using dew harvesting in dry and semidry regions.

Utilization of dew harvesting using nanoclay materials

General Objective:

Study the impact of utilization of nanoclay on the germination of barley using dew harvesting in the Jordanian desert.

The experiment procedures:

First: plowing and preparing the land: the land shall be plowed and fertilizers shall be applied and seeds shall be used at the rate of 2 kg of each material.

Second: Nanoclay: nanoclay shall be added to water and used in treating the soil of the piece of land allotted for the experiment once and at a depth of 20 cm

Third: measurements:

1. Length (cm): the length of the plants shall be measured every ten days approximately for all materials.
2. Heat and humidity: humidity and heat shall be measured

The budget:

25000 Jordanian Dinar (twenty five thousand Jordanian Dinar)

Timeframe:

One year

Project no. (2)

The production of nanomaterials from Jordanian medicinal plants and the study of the germ (bacterial and fungal) and insect activities and assessment of their bacterial and fungal activities

Background and justifications:

The Jordanian medicinal plants is considered an important source of secondary materials that could be used as an alternative for antibiotics

General objective:

Micropropagation, maintenance of Jordanian medicinal plants and producing secondary materials and study of their resistance to bacteria, fungus and insects.

Specific objectives:

1. Developing a simple method for micropropagation of medicinal plants through tissue culture
2. Developing a simple method for preserving medicinal plants for medium range periods
3. Developing a simple method for producing secondary materials
4. Developing a simple method of resistance of fungus, bacteria and insects.
5. Studying the factors affecting secondary material through tissue culture.

Expected results:

1. Developing a simple method for micropropagation of medicinal plants through tissue culture
2. Developing a simple method for preserving medicinal plants for medium range periods
3. Developing a simple method for producing secondary materials
4. Developing a simple method of resistance of fungus, bacteria and insects.

Key activities and implementation timeframe:

1. Collecting plant samples from different regions- first year
2. Micropropagation of plants at the greenhouse- first year
3. Micropropagation of plants I the lab- first year
4. Producing secondary material- second year
5. Study of the effect of secondary materials on fungi, bacteria, and insects- second year

Timeframe:

Two years

Estimated cost according to implementation timeframe:

One hundred forty thousand Jordanian Dinar (eighty thousand Dinar in the first year and the second year forty thousand Dinars in the second year)

Follow up and evaluation responsibility:

- Al Balqaa University
- The National Center for Research and Development

Project no. (3)

Production of organic liquid fertilizers and assessment of its effect on plant production in arid lands

General objective:

The research aims at producing organic liquid fertilizers derived from local sources such as dung and farm wastes.

Specific objectives:

1. Assessment of the impact of fertilizers on the production property and the crop type
2. Assessment of the role played by fertilizer in combating pest inflecting crops.
3. Assessment of the impact of the fertilizer in lessening the quantity of irrigating water required.
4. Developing the best type and quantity of organic fertilizers to be used to get the best quality of plants and highest crop productivity.
5. Specifying the accumulative effect of organic fertilizers.

The developmental aspect

Development of a simple method helping farmers to produce this type of fertilizer and ways of using it with their plants without inflecting harm on the environment

Key activities and implementation timeframe:

The following crops are to be cultivated (onion, lettuce, carrot, radish and olive trees) for two consecutive seasons using four materials (Shahid, dry organic fertilizer, liquid organic fertilizer, and dry and liquid organic fertilizer).

Timeframe:

Two years

Estimated cost according to implementation timeframe:

Seven thousand Jordanian Dinar (four thousand dinar in the first year and three thousand Dinar in the second year

Follow up and evaluation responsibility:

- National Center for Research and Development

Project no. (4)
Effect of using nano water on productivity and behavior of chicken

General objective:

The study of the impact of the concentration and different levels of nano water in drinking water on the behavior and productivity of chicken.

Different variables are calculated according to the following equations:

The conversion rate= (weight of chicken flock/weight of fodder used)* 100%

Conversion efficiency= weight of fodder used/weight of the flock

Daily growth rate= total weight of chicken/number of days

Average chick weight= total weight/number of chicken

Death rate= total number of chicken – the remaining number of chicken/the total number of chicken x 100%

Consumed fodder = total fodder- remaining fodder

Net profits= revenues – costs

Blood and remnant analysis

Budget

10000 Jordanian Dinar (ten thousand Jordanian Dinar)

Timeframe:

One year

Follow up and evaluation responsibility:

- The National Center for Research and Development

Project no. (5)

Production of two sheep breeds through crossbreeding three breeds in Jordan

Production of new sheep breeds

General objective:

This research aims at producing two sheep breeds through crossbreeding three breeds in Jordan. The resulting breed shall contain 50% Safolak breed and one of the three other breeds (Romanof, Sahroleya and Al Awasi) to be used as DNA for producing the new hybrid .

Specific objectives:

1. DNA analysis for selection and testing RELP-PCR for selecting the best genetic characteristics to improve the milk production.
2. DNA assessment to recognize the rate of improvement based on the animal records. The characteristics of slaughtered livestock shall be tested through slaughtering 5 animals of each breed.

Expected results:

1. Selection of two breeds of sheep in Jordan
2. Selection of the best genetic characteristics for improving the milk production
3. Study of the slaughtered animals characteristics of two of the produced breeds

Key activities and implementation timeframe:

The experiment shall be conducted in the University ofScience Center for Livestock research and guidance for producing two sheep hybrids. The resulting breed shall contain 50% Safolak breed and one of the three other breeds (Romanof, Sahroleya and Al Awasi) to be used as DNA for producing the new hybrid.

In order to produce the first generation of Romanof x Awasi and Sharwleya x awasi, 150 Awasi sheep will be used through making Romanof and Sharwaleya rams fecundate them. The first generation shall be used in producing three breeds through fecundation by Safolik rams.

Timeframe:

Three years

Estimated cost according to implementation timeframe:

Thirty thousand Jordanian Dinar) fifteen thousand in the first year, ten thousand Dinar in the second year and five thousand dinars in the third year)

Follow up and evaluation responsibility:

- University of Science and Technology
- The National Center for Research and Development

Project no. (6)

Water and energy utilization audit program

Water and energy audit program

Background and justifications:

Water and energy represent the largest development challenges facing Jordan. The treasury bears extra economic burdens for providing those items for the citizens at affordable prices to enable them to practice their daily activities. The Jordanian government gave those sectors the priority in the major development projects. For instance, Disi water conveyance project solved a part of the water problem but this project would make the government bear economic burdens due to pumping water from long distances to Amman in addition to the energy cost and the resulting environment impact. There are projects aiming at rationalization of use of energy and finding alternative forces such as solar energy, and wind energy but those projects are still in the bud. In spite of the fact that the sources of energy and water in Jordan are limited, there is a lot of bleeding for those sources and there are no projects up till now that seek to audit the utilization of water and energy in different fields in Jordan. Due to its significance, the project of developing a national program for auditing the usage of water and energy arose. This shall contribute to find innovative solutions for increasing the efficiency of the utilization of those two sources.

General objective:

Development of an audit program for the efficient use of water and energy.

Specific objectives:

- Development of a model for assessment of the administration and efficient use of water and energy in industrial and commercial institutions and households..
- Assessment of the administration of water and energy in industrial and commercial institutions and households.
- Specifying a baseline for the recommendations of the increase of the efficient use of water and energy in the commercial and industrial institutions and households.
- Qualifying Jordanian cadres to perform the auditing of the efficient use of water and energy.
- Establishing a unit within the National Center for Research and Development entrusted with the development of all procedures related to auditing the efficient use of water and energy.

Expected results:

- A national program for assessing the efficiency of utilization of water and energy in the industrial and commercial institutions and households.
- Enhancing the efficiency of utilization of water and energy in industrial and commercial institutions and households
- Reducing the production cost.
- Better economic revenues and environmental impact.

Timeframe:
The project shall be implemented in three years

Estimated cost according to implementation timeframe:
The estimated cost is about 250,000 Jordanian Dinar

Follow up and evaluation responsibility:
The National Center for Research and Development

Project no. (7)

Evaluation of sediments of King Talal and Mujib dams: agricultural utilization and impact on the quality of water.

Evaluation of sediments of Talal and Mujib dams for agricultural use

Background and justifications:

Jordan has witnessed during the last decade a remarkable expansion in the agricultural sector and a speedy population increase leading to the increase of pressures on the scarce water resources. Jordan is currently facing a severe shortage in the water supply as it is considered one of the poorest countries in the world in water resources.

Agriculture is considered the main consumer of water. Expansion in irrigated plantations due to the increase in the demand on agricultural crops because of the population increase in addition to the emergence of cash crops markets, contributed to overcultivation of lands and planting infertile lands, bleeding the soil and shortening the periods of leaving the land without cultivation. Such unsustainable agricultural practices together with soil erosion, led to the decrease of the fertility of the land and the drop in the agricultural crops productivity and led to the deterioration of the soil in many parts of the country.

To bridge the gap between the increasing demand and the scarcity of water resources, the government is giving priority to establishing new dams to provide for the shortage in water supply. The high rates of sediments represent one of the worrying problems. Accumulation of sediments led to the gradual loss of the storage capacity of dams. Furthermore, sediments on the bedrock of the dam lead to the decline of the quality of water due to the release of the trace elements and other toxic elements accompanying sediments in water.

King Talal and Mojib dams, which were constructed for agricultural reasons, are considered one of the good examples of dams that suffer from high accumulations of sediments that led to decreasing the storage capacity of the dams in addition to the decline of the quality of water that has become a permanent source of concern for decision makers.

Because the bedrock sediments are rich in nutrients, they could be used as a source of natural enhancer to the soil instead of manufactured chemical fertilizer. Hence, the idea of this proposed study for evaluating the usability of bedrock sediments of Talal and Mojib dams as a source of agricultural soil in the regions that lack in soil or as natural enhancers to enrich the poor soil and enhancing the quality of the dam waters.

General objective:

Evaluation of suitability and usability of bedrock sediments of Talal and Mojib dams as a source of agricultural soil to be moved to the regions that lack in soil or as an enhancer for poor soil.

Specific objectives:

- The study of the source, nature, and types of the nutrients carried with sediments.

- Specifying the mineral and chemical structure and the granular volume and features of the accumulated sediments at the dam bedrock.
- Understanding the nature of the nature of the interaction between sediments and water.
- Estimating the quantity of accumulated sediments in the dam lake and the annual sedimentation rate.
- Evaluation of the quality of the water in the dam lake
- Evaluation of the suitability of the dam sediments to be a soil for cultivation based on the geochemical and mineral analysis of the sediments.
- Evaluation of the usability of the dam bedrock sediments as natural enhancers for the soil and how capable they are to enrich the soil.
- Conducting a feasibility study for removing and transferring the dam sediments and using them in agriculture.

Expected results:

1. Increasing the storage capacity of the dams(through reducing the quantity of sediments in the dam lake) and reducing the cost of building new dams.
2. Increasing the life expectancy of the dam
3. Improving the quality of the dam water through:
   a. Removing pollutants (plant nutrients and heavy metals) and preventing the growth of algae
   b. Enhancing the clarity and purity and of water
4. Enhancing the fertility of the soil through:
   a. Adding basic nutrients to the soil after blending it with the dam bedrock sediments (with experimental rates)
   b. Supply of scarce-soil lands with artificial soil.
   c. Increasing the capability of the soil to retain water and humidity (through increasing the porosity of the soil
   d. Decreasing of the artificial running of water and increasing the quantity of water leaked into the soil leading to reducing the soil erosion.
   e. Reducing the running water, and the wasted water through vaporization and increasing the feeding the underground water.
   f. Increasing the productivity of the land and reducing the cost of agricultural production (through adding nutrients to the dam bedrock sediments instead of chemical fertilizers)
   g. Decreasing the environment impact resulting from the pollution of the surface and underground water due to using chemical fertilizers.
5. Increasing the agricultural production that shall have positive social results:
   a. Providing new job opportunities and reducing the rate of traditional immigration from the villages to the cities.
   b. Social stability (especially for the farmers families in rural areas)

Key activities and implementation timeframe:

1. Conducting a field survey for specifying the thickness and quantity of dam bedrock sediments and specifying locations for collecting bedrock sediments dam lake water samples after the end of the first raining season and before the beginning of the next raining season (spring and summer)
2. Measuring the oxygen percentage melt and the acidity in the field

3. Conducting the volume analysis of sediments.
4. Conducting chemical analysis of sediments and water samples to determine the concentration of the rare and common elements in addition to the total organic content (TOC) and Cation Exchange Capacity (CEC) and the carbonate content.
5. Conducting an X-ray for specifying the mineral composition of sediments especially the mud minerals to specify their capacity of absorbing nutrients and other elements.
6. Testing the soil fertility (plant production) for different crops planted in different types of soil composed of original soil mixed with different percentages of dam bedrock sediments and measuring the efficiency in retaining humidity and water.
7. Conducting a feasibility study for the removal of the dam sediments and transferring them into scarce-soil lands and adjacent lands of the place of conducting the study to use it in agriculture.

Timeframe:
30 months

Estimated cost according to implementation timeframe:
65000 Dinar including the Eco-sound equipment which costs about 35000 Dinar

Follow up and evaluation responsibility:
- Yarmok University
- The National Center for Research and Development

Project no. (8)

Introduction of MBA programs for management of renewable energy and energy efficiency projects

MBA programs for renewable energy and energy efficiency

General objective:

The project aims at initiating the pairing of practical and economic aspects, on the one hand, and the theoretical aspects, on the other, in studying the renewable energy and energy efficiency projects.

Specific objectives:

1. Providing learners with the modern management skills in addition to the technical aspects of the renewable energy and energy efficiency projects.
2. Learning new methods and ways of solving energy and environment problems.
3. Being acquainted with international policies and strategies of renewable energy technologies and energy efficiency.
4. Learning the different technologies of renewable energy and energy efficiency and their applications within the financial, economic and administrative conditions and limitations.

Expected results:

1. Graduating patches of trained engineers who are qualified to work in the field of renewable energy and energy efficiency and their different applications.
2. Partnership between academia and the companies and institutions working in the field of renewable energy and energy efficiency.
3. Implementing graduation projects and MA theses based on real projects on the ground.

Key activities and implementation timeframe:

1. Setting up criteria for selecting students from among those who are working in the field of energy and electricity.
2. Admission of students to the programs after making sure that they are qualified to join as per the objective set criteria.
3. Setting up an academic program for the two programs jointly between the academia and the companies and institutions working in the field of energy and electricity.
4. Getting the approval of the Ministry of Higher Education and the Higher Educational Institutions Accreditation Board.

Timeframe:

One year for the preparation of the study program and getting required approvals and implementation shall start in the second year.

Estimated cost according to implementation timeframe:

The capital cost of establishing labs and the implementation of students' projects is estimated at half a million Dinar. The operational cost is estimated at about one quarter million Dinar.

Follow up and evaluation responsibility:

A government university and another private university shall be selected for the implementation of the two programs during the first phase. Selection shall be conducted based on competition among the applying universities and their capabilities that could guarantee the success of the two programs.

A summary of the proposed projects for the clean technology cluster

SR. No.	The name of the project	Estimated cost (Dinar)
1	The impact of the utilization of nonoclay on the germination of the barley using dew harvesting in dry and semidry regions.	25,000
2	The production of nano materials from Jordanian medicinal plants and the study of the germ (bacterial and fungal) and insect activities	140,000
3	Production of organic liquid fertilizers and assessment of its effect on plant production in arid lands	7,000
4	Effect of using nano water on productivity and behavior of chicken	10,000
5	Production of two sheep breeds through crossbreeding three breeds in Jordan	30,000
6	Water and energy utilization audit program	250,000
7	Evaluation of sediments of King Talal and Mujib dams: agricultural utilization and impact on the quality of water.	65,000
8	Introduction of MBA programs for management of renewable energy and energy efficiency projects	750,000
	Total	1,277,000