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Innovation for Development: The Case of Jordan

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ABSTRACT

The competitiveness of nations is nowadays not determined by single companies, but innovative activities of entire industries and branches (OECD, 1997). Stimulating research and innovation can be considered as one of the major tasks of a national approach to increase the wealth of a domestic economy. It aims at different objectives, like economic growth, full employment, and positive balance of payments from international trade (GTZ, 2009).

Jordan's NIS is still underdeveloped and not working efficiently. The innovation system still suffers from weak and lack of coordination between its components. In order to build a national innovation system in Jordan, there is a need to be opened up to global knowledge, reform of universities and R&D organizations, upgrade R&D infrastructure, establish an incubation system, and focus on premier universities as key knowledge institutions. As well, Jordan need to develop human resources, promote ICT, build national innovation policy, and build knowledge network.

Keywords: National Innovation System, Science and Technology, Sustainable Development, Jordan.

INTRODUCTION

Innovation is of high priority in the Middle Eastern countries and surrounding areas. Plenty of policy measures and support schemes aimed at innovation have been implemented or are under preparation, with different impact. The diversity of these measures and schemes reflects the diversity of the framework conditions, cultural preferences and political priorities in the Middle East. Policy makers can stimulate the innovation ability of a national innovation system (NIS) by setting appropriate framework conditions as well as by public investments in infrastructure, education and funding innovation stimulating programs (Badran, 2010).

Jordan is one of the smallest and poorest economies in the Middle East, with 14 percent of Jordanians living below the poverty line (DoS, 2011). The country suffers from structural unemployment, as the economy fails to absorb the annual inflow of new job seekers. Moreover, Jordan's active-to-total population ratio is one of the lowest in the world, with an average of four non-active individuals depending on a single worker. Unless this situation is reversed, significant economic growth and wealth will be difficult to achieve. With the current population growth rate and the economic status-quo, unemployment rates could well exceed 20 percent in the coming ten to fifteen years (MoP, 2011).

Innovation is seen as an essential tool to alleviate poverty; poverty is nothing else than a situation with a high level of constraints which can only be overcome by smart, innovative solutions (Smith, 2003). The national innovation systems approach stresses that the flows of technology and information among people, enterprises and institutions are key to the innovative process. Innovation and technology development are the result of a complex set of relationships among actors in the system, which includes enterprises, universities and government research institutes, etc. .

Innovation systems can be at national, regional, or local levels each being a subset of the next higher category (Jones, 2003). According to Freeman (1987) a national system of innovation has been defined as "the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify

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and diffuse new technologies". This research focuses on the following components of Jordan's national innovation system:

- Government
- Education
- Business
- ICT
- R&D
- Business incubators and entrepreneurship
- Capital
- Culture

OBJECTIVE

The main objective of the research is to assess and discuss the components of the national innovation system: government, education, business, ICT, R&D, business incubators and entrepreneurship, capital, and culture. As well, the research presents recommended interventions that aim to sustain the economic development in Jordan.

METHOD

In order to achieve the abovementioned objective, a related literature of Jordan, NIS, science and technology and economic development were reviewed and semi-structured interviews with experts and professionals from the public, private, and academic sectors in Jordan were conducted.

CURRENT INNOVATION SYSTEM IN JORDAN

Jordan is notably resource-poor, with limited agricultural land, no oil resources and considerably scarce water. Jordan's only natural resources are potash and phosphate. Employment is mainly based on services (77%), 20% of the labor force depends on industry and 3% on agriculture. Jordanian economy grew by about 3% in 2010. It is estimated to remain at about 5% during the next years, mainly led by manufacturing, construction, real estate and services sector (CIA, 2011).

Based on The Global Competitiveness Report 2010, some of the recent findings on Jordan's competitiveness are summarized as follows: well-defined property rights, efficient government spending, a low burden of government regulation and a fairly efficient legal framework, coupled with a very safe and secure environment ensure that the country's institutions receive a positive assessment. At the same time, the report shows that more actions are needed to improve the business environment (WEF, 2011).

Government

Jordan is opening the economy much more than neighboring countries through the establishment of a network of free trade agreements (FTAs) with strategic commercial partners. Jordan signed FTAs with the USA and Turkey. It is a member, along with Egypt, Morocco and Tunisia, of the Agadir FTA and it is moving towards the dismantling of tariff barriers on imports from the EU by 2011 (JMoP, 2011).

Jordan founded its main national university, the University of Jordan, in 1962 and its main industrial research centre, the Royal Scientific Society, in 1970, yet adopted a National Science and Technology Policy only in 1995. On behalf of the government, the Higher Council for Science and Technology (HCST) developed national research strategies for five-years-periods covering the years 2011 to 2015 (HCST, 2011). The interviews from the governmental sector are well aware of needs for a strong innovation policy; they tend to announce their own innovation programs but without having a full coordination between the different ministries. The reason could be due to the lack of having a written national innovation policy.

Clusters and networks are important as well as effective instruments for the promotion of innovation, development of economy and business as well as location marketing (Porter and Stern, 2001). Clusters around ICT and pharmaceutical industries are exist in Jordan, but could generate increased leverage when these clusters are sufficiently supported by public authorities.

Education

Although, the literacy rate in Jordan is one of the highest in the region, Jordan's primary and secondary education systems do not promote innovations. The system is built on memorizing textbook facts instead of creative learning systems or explorative research. In this sense, the academic system up to the BA grade is an extension of the rigid school system. Only in master courses, students are exposed to independent learning and are applying creative learning concepts. Interests in innovations are thereby stimulated far too late in the educational system. Only a few dedicated courses to innovation management and entrepreneurship can be found in public universities while private academic institutions seem to be slightly more advanced in this

field. Some institutions like e.g. KAFD[1] address this situation in schools and try to support pupils accordingly.

The number of public universities as a result has reached (10), besides (17) universities that are private, and (51) community colleges, this is in addition to the World Islamic Sciences and Education University. This progress in numbers of universities accompanied by significant increase in number of students enrolled to study in these universities, where the number of enrolled students in both public and private universities is estimated at nearly (236) thousand; (28) thousand out of the total are from Arab or foreign nationalities (MHESR, 2011). Thus, the pride created by this development as well as progress puts us face-to-face with various challenges, the thing which leads us to pay more efforts in order to overcome the difficulties and obstacles stand before us, to realize a balance between the spread of higher education and its establishment from one side, and its level and quality from the other.

The Higher Education sector lacks a unified and comprehensive strategy to strengthen governance and drive sector development. The sector structure is also highly skewed toward academic learning at the expense of technical education. This is placing increasing pressure on public universities as demand for higher education soars. The Ministry of Higher Education is not well-equipped to address the sector's needs as it lacks the required capacity to conduct effective policy-making.

Business

Economy in Jordan is nearly completely based on very small enterprises (micro). According to the Ministry of Industry and Trade, 92 % of enterprises are micro (less than 10 employees), 7.4 % are small and medium-sized (10 to 249 employees) and only 0.6 % are large (MIT, 2011). The majority of these SME are family owned businesses and belong to the trade sector. Most of the SME are not innovative and several studies see a lack of political support as well as lacks of finance and technological oriented staff (Sultan, 2010).

According to the World Bank country profile "Doing Business, 2010", Jordan is ranked 100 of 183 in total; it is ranked as 125 for starting a business and getting credit as 127. Getting capital and especially risk capital is the major problem for entrepreneurs in Jordan. This problem can only be solved by clearly changing the respective policy. If budgets are available, there would be a lot of institutions that could directly and personally support entrepreneurs. Experts from chambers of industry and commerce as well as Jordan Engineers Association declared that these and other organizations are well prepared to do fulfill these tasks. Chambers for Industry and Commerce are considered to be very strong. Chambers offer full support for all members covering administration issues as well as training programs for business (management, legal affairs and financial affairs). For each professional group, there is a kind of "union" of which they have to be a member.

Information and Communications Technology (ICT)

Jordan has taken some major steps in the last few years towards creating a dynamic and practical approach to be a part of the international Information and Communications Technology (ICT) sector (Jordan ICT Forum, 2011). A number of initiatives have been developed to increase digital penetration, improve education and stimulate demand for internet services in particular and communications services in general such as: regulatory framework, fixed line telecommunication, mobile telecommunications, information technology and internet service providers, and postal services.

Jordan faces most of the same challenges that other developing countries face in cultivating growth in the private sector and ICT industry. Jordan's telecommunications services are relatively well developed—and mobile phone penetration rates are high—but lack redundancy and broadband internet access is extremely expensive. This places PC ownership and technology utility beyond the reach of most Jordanians. Various legal and regulatory hurdles prevent the smooth operation of the market for ICT products and services. Moreover, the Government—the major buyer of ICT services in Jordan—lacks understanding of ICT and maturity as a consumer.

UNESCO Science Report 2010 shows that Jordan has a relatively low share of high-tech exports in total manufactured exports (1.1%). High technology contributes to rapid growth and is a major source of wealth generation. High-tech exports are a function of a country's level of inward foreign direct investment, consumer demand at home and technological infrastructure.

Research and Development (R&D)

Jordan's heterogeneous R&D framework consists of

[1] King Abdulla II Fund for Development

public and private universities as well as national research centers. A part from general research, these institutions focus their work on the areas water, energy, biotechnology, nanotechnology and ICT (MHESC, 2011). Effective technology transfer processes are still under development and state initiatives to stimulate cross fertilization between industry and the academic institutions are little accepted and not very effective.

In 2005, Jordan introduced a law whereby 1% of the net profit of public shareholding companies was transferred to a special R&D fund to finance research. Another law has since been introduced that compels public and private universities to allocate 5% of their budgets annually to R&D. Together with the funding made available by the Middle East Science Fund, these measures will considerably raise Jordan's gross domestic expenditures on R&D (GERD), starting from 2008 (Badran, 2010). It is worth to mention that Jordan has the highest number of researchers per million population in the Arab world which is equivalent to 1952 in 2007 as well Jordan is among the top three Arab countries according to number of scientific publications per million population in the Arab world (UNESCO Science Report, 2010).

Researchers and industry are not in the position to develop competitive technologies for international markets without institutional innovation providers, like technology transfer centers. As far as Jordan is concerned, the regulations for some universities set out clear mechanism in which scientific centers for technology transfer can be established. Examples of existing centers are Hamdi Mango Centre for Scientific Research and National Energy Research Centre at the Royal Scientific Society as well as Princes Haya Biotechnology Centre and Pharmaceutical Research Centre at Jordan University of Science and Technology (GTZ, 2010). Unfortunately, these centers would be capable to contribute to technology transfer, but can't do it sufficiently in reality, due the lack of funding.

Entrepreneurship and Business Incubation

There are some effective activities of supporting entrepreneurship into force (GTZ, 2010). There are several activities as for instance in the Queen Rania Centre for Entrepreneurship, or support for business women by the Jordan Forum for Business & Professional Women. These activities are scored to be very effective, but they are driven by highly engaged persons, fighting for financial support most of the time.

Business incubators are initiatives which stimulate the commercialization of innovations by supporting entrepreneurial ventures by a wide array of business support services. Jordan also embarks on incubators to stimulates its innovation and entrepreneurial climate. Jordan's network of incubators proliferates but the innovative outcome is only moderate. The financial support of early phase entrepreneurial ventures in these incubators is quite low and a significant portion of young entrepreneurs seem to migrate in a later stage to the Gulf States due to the financial incentives in this region. The Gulf States thereby capitalize on this brain drain which is directly financed by Jordan.

Capital

Jordan's financial support system of innovative entrepreneurial ventures is still underdeveloped. While seed capital generally exists, grants for capital intensive entrepreneurial ventures are very small. Business angel networks are only rudimentary existing and banks are very conservative and risk averse in their investment behavior even with a third party coverage. The venture capital instrument is still underdeveloped due to current legislation.

It is a main problem for start-up companies and entrepreneurs, that no risk- or venture capital is available. Even "normal" credits by banks require complete guarantees. SME do not have the financial resources to have R&D activities on their own. Nearly no public funded program on applied R&D is available today.

Culture

According to Williams and McGuire (2005) national culture is "a system of socially constructed meanings and values that members of a nation develop and pass on to others; these values have resulted from the culture's successful dealings with problems of the environment and the complexities of ordering social relations and integrating people". Thereby the cultural framework becomes also influential for creativity and innovation (Hofstede, 2001; Schein, 1985). Thus, cultural development plays an important role in political, economic and social development.

In Jordan, however, the cultural sector is witnessing many challenges that threaten to compromise cultural and artistic outputs and constrain innovation, mainly, due to the lack of clear national policies and strategies required

to coordinate efforts between the different players. The traditional trading orientation of the culture seems to be less geared towards innovation than a culture with is more manufacturing oriented. This might be one reason for the undeveloped innovation and entrepreneurial system in Jordan.

CONCLUSUIONS AND RECOMMENDATIONS

Jordan's innovation system is still underdeveloped and not working efficiently. The system still suffers from weak and lack of coordination and managed links between its components. In Jordan, however, the cultural sector is witnessing many challenges that threaten to compromise cultural and artistic outputs and constrain innovation, mainly, due to the lack of clear national policies and strategies required to coordinate efforts and provide funding. However, the culture of entrepreneurship is acknowledged as one of the main elements to achieve economic development in Jordan**.**

The main challenges facing sustainable development in Jordan are weak linkages between education and business institutes, low R&D expenditure, few scientists and engineers, non competitive industry and knowledge, low usage of ICT, limited private sector R&D and innovation activities, and brain drain. Determinants related to technology transfer centers, technology/science parks and clusters are rated below average, which means that these tools for turning innovation into practice are not as matured.

Education and labor force lack an overarching vision at the highest level of government that would serve to guide and coordinate reform initiatives. There exist many persistent national systemic barriers to the creation of an educational system that is demand driven, competency-based, flexible and responsive. Main general obstacles are: the pervasiveness of the academic model, bureaucratic processes, and the lack of performance management systems. In addition, there is an absence of a vehicle for creating a vision for education and leading and coordinating the growth and development, and the absence of strategic planning for the educational and business sub-sectors. In addition, labor market and institutional performance information is not being utilized for program planning.

At the business level, it is obvious that more than 90% of industries are classified as small family administered businesses. This implies that efforts have to be devoted to enrich the family business administration tools and mechanisms and tackle small scale related problems in financing, promotion, technical assistance, raw materials and other business essentials.

In order to build an innovation national system, Jordan should be opened up to the global knowledge, reform of universities and R&D organizations, promote incubation system, attract foreign direct investment (FDI) for both domestic and export markets, wide consultation with private sector, scientists, government officials and economists, and promote ICT. Above all, there should be a legislation that governing the relationship between all NIS enablers.

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الإبداع من أجل التطوير: المملكة الأردنية الهاشمية

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ملخـص

يعد الإبداع من أساسيات خلق تنافسية وطنية للدول وهذه التنافسية الوطنية تبنى على أساس العلاقات المتداخلة بين مكونات النظام من الحكومة والتعليم والقطاع الخاص والبحث والتطوير ورأسمال المال والثقافة. والتنافسية بدورها تعمل على تحسين النمو الاقتصادي وخلق فرص عمل وزيادة الصادرات.

ان نظام الإبداع الوطني في الأردن يعتبر متواضعا ويعود السبب الرئيس إلى ضعف التنسيق والتداخل بين مكونات النظام والافتقار إلى سياسة وطنية مكتوبة بالخصوص. ومن اجل تطوير النظام توصي الدراسة بالانفتاح على الاقتصاد العالمي وإعادة هيكلة نظام التعليم بما يتوافق وسوق العمل والتركيز على البحث والتطوير وزيادة عدد العلماء العاملين في مجال البحث العلمي وزيادة الموازنات المخصصة للبحث العلمي التطبيقي وإنشاء حاضنات للأعمال إضافة إلى زيادة الاهتمام بتكنولوجيا المعلومات والاتصالات.

الكلمات الدالة: نظام الإبداع الوطني، العلم والتكنولوجيا، والتطوير المستدام، الأردن.

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