Repositioning NCRD

to accelerate the STI eco-system strategically

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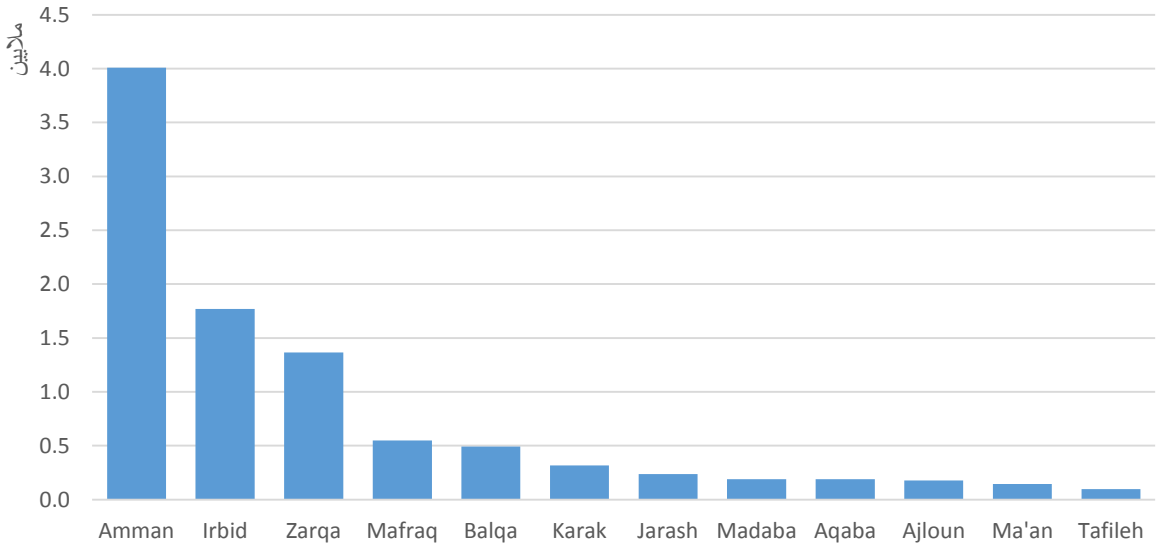
Political Climate

According to the general population and housing census in 2015, Jordan hosts a population of 9,559 million people (Department of Statistics, Jordan in Figures, Issue 18, Population, 2016) and of those, approximately 2,9 million are guests who are Syrians, Egyptians and Palestinians (Department of Economic and Social Affairs, 2017). Despite being a small country with few natural resources, The Hashemite Kingdom of Jordan played a pivotal role in the struggle for power in the Middle East.

Figure 1. Population (UNICEF, 2015)



Unlike Arab states to the south and east, Jordan has no oil of its own. Its resources are limited to phosphates and agricultural produce. The economy depends largely on services, tourism and foreign aid, of which the US is the main provider. Jordan prides itself on its health service, one of the best in the region. Jordan's significance results partly from its strategic location at the crossroads of what Christians, Jews and Muslims call the Holy Land. It is a key ally of the US and, together with Egypt, one of only two Arab nations to have made peace with Israel.

The civil war in neighboring Syria has seen Jordan play host to some 1,3 million Syrian refugees in 2015, while the stressed climate in Iraq also presents security challenges for Amman. Jordan hosted Syrian refugees, although authorities tightened entry restrictions and held thousands of Syrians in remote border areas with limited access to humanitarian aid. Like the most countries in the similar circumstances such as Turkey, the heavy flow of refugees brings along monetary and social issues (Human Rights Watch, 2017).

Table 1. Population by age groups (UNICEF, 2015)

Population, total (millions)	9.53
Female population 47% (millions)	4.48
Male population 53% (millions)	5.05
Dependency ratio, old age (65 and older) (per 100 people ages 15-64)	5.80
Dependency ratio, young age (0-14) (per 100 people ages 15-64)	53
Population, ages 65 and older (millions)	0.30
Median age (years)	24
Population, under age 5 (millions)	1
Population, urban (%)	83.40
Sex ratio at birth (male to female births)	1.05

Higher frequency of security incidents is materializing around Jordan exposing its vulnerabilities in addition to social discontent. Security incidents at the Jordan-Syria border have been on a rise in 2016, with northern and northeastern borders declared as a military zone. Land routes to Syria and Iraq remain closed (since April and July 2015, respectively) despite high level discussion for the re-opening of the latter. A number of protests have manifested including those opposing the signing of a gas deal between NEPCO and Noble Energy.

Controversy has also arisen in relation to proposed curriculum reform with religious conservatives accusing the reform as fulfilling a secularist agenda. The reforms are part of a larger effort in the education sector in line with Vision 2025 and the recently launched National Committee for Human Resources Development.

Parliamentary elections proceeded largely smoothly with preliminary results indicating some new elements, with 36 percent voter turnout. The 20 September 2016 Parliamentary elections had elements of a proportional representation system under a new law that moved away from

the one man-vote system that had been in place since 1994. Close to 1.5 million Jordanians voted out of more than 6 million citizens, the highest number to go to the polls in Jordan's history, with forty percent of voters under the age of 40. A new government was announced on 28 September 2016 comprising 29 ministers of which 22 unchanged from the previous government and the introduction of three new portfolios (ministers of state for investment affairs, economic affairs and foreign affairs (The World Bank, 2016).

The fiscal and external deficits will remain large with Jordan dependent on foreign support. Real GDP growth will pick up from 2017 but will still be dampened by prolonged regional instability (The Economist, 2017).

Figure 2. Current GDP (USD)

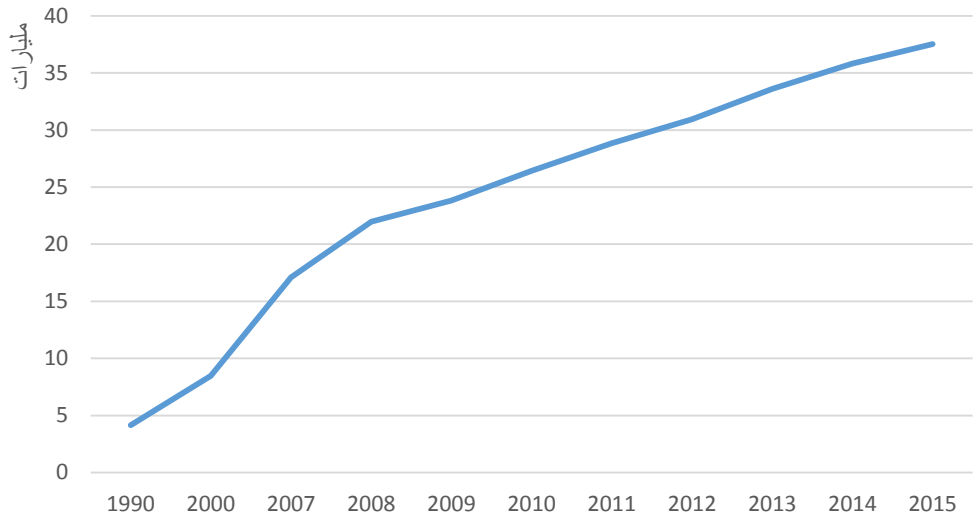
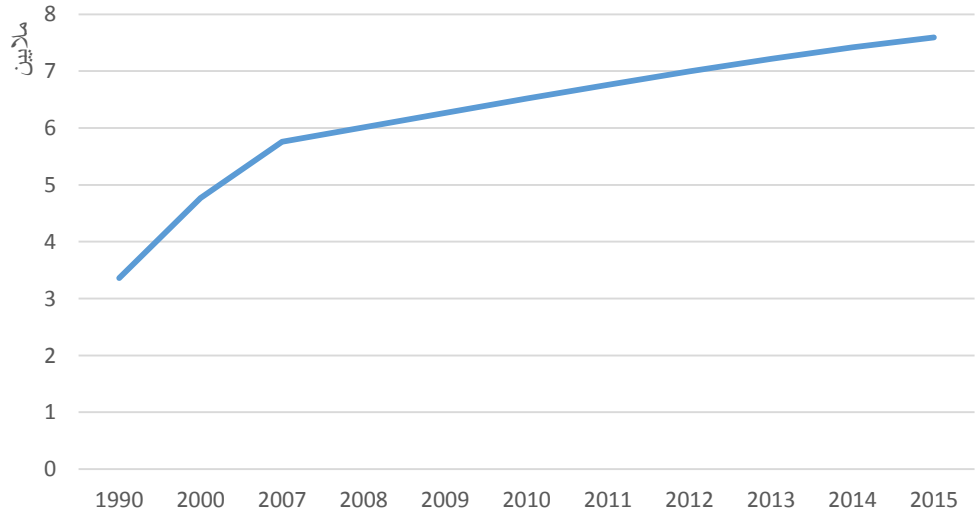


Figure 3. Population (excluding refugees)



There is a stable increase in the national GDP, however population grew drastically in recent years keeping the GDP per capita stable.

Sustainable Development Goals

At the United Nations Conference on Sustainable Development in Rio de Janeiro in 2012, the Sustainable Development Goals (SDGs) were born. The objective was to produce a set of universal goals that meet the urgent environmental, political and economic challenges facing our world.

The SDGs replace the Millennium Development Goals (MDGs), which started a global effort in 2000 to tackle the indignity of poverty. The MDGs established measurable, universally-agreed objectives for tackling extreme poverty and hunger, preventing deadly diseases, and expanding primary education to all children, among other development priorities.

The Sustainable Development Goals (SDGs), otherwise known as the Global Goals, are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity.

These 17 Goals build on the successes of the Millennium Development Goals, while including new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities. The goals are interconnected – often the key to success on one will involve tackling issues more commonly associated with another (UNDP, Sustainable Development Goals, 2012).

At the Sustainable Development Summit in September 2015, UN Member States adopted the 2030 Agenda for Sustainable Development, which includes a set of 17 Sustainable Development Goals (SDGs) to end poverty, fight inequality and injustice, and tackle climate change by 2030. The SDGs are basically built on the eight Millennium Development Goals (MDGs), adopted in 2000, but take off from those in important ways.

Seven of the MDGs focused on issues such as poverty and hunger, education, communicable diseases, maternal and child mortality, gender inequality, and environmental degradation, intended solely for developing countries, while the 8th goal—A Global Partnership for Development was intended to track rich country support. The new Global Goals, and the

broader sustainability agenda, go much further than the MDGs, designed to apply to rich countries as well as developing countries, addressing the root causes of poverty, inequalities and unsustainable production and consumption as well as the obstacles to achieving development that works for all people (Awad, 2016).

The SDGs came into effect in January 2016, and they will continue guide UNDP policy and funding for the next 15 years. As the lead UN development agency, UNDP is uniquely placed to help implement the Goals through our work in some 170 countries and territories.

1. No poverty
2. Zero hunger
3. Good health and well-being
4. Quality education
5. Gender equality
6. Clean water and sanitation
7. Affordable and clean energy
8. Decent work and economic growth
9. Industry, innovation and infrastructure
10. Reduced inequalities
11. Sustainable cities and communities
12. Responsible consumption and production
13. Climate action
14. Life Below Water
15. Life on land
16. Peace, justice and strong institutions
17. Partnerships for the goals

The full extended list of SDGs and targets have been given in detail in 2. The 2030 Agenda for Sustainable Development: Goals and Targets (United Nations, 2015).

In 2015, “Jordan 2025. A national vision and strategy” was released, through which previous policies, strategies and recommendations were reviewed and a broader process of engagement was set. The strategy includes several Sustainable Development Goals (SDGs), including the eradication of poverty, the improvement of the educational system, the provision of clear water and sanitation, the guarantee of decent work and economic growth and the development of the sustainable communities and cities, but still a lot needs to be done in order for this approach to be effective and enable Jordan’s development to be inclusive and sustainable.

Economic Climate

While the Jordanian economy has held up, it has been underperforming from its potential. Growth of 2.3 percent in the first quarter of 2016 was an improvement in comparison to 2015. However, the same trend did not keep stable in the second quarter and on the average, the first

half of the year was observed a flat growth (from 2.1% to 2.2%). The Department of Statistics issued the results of the quarterly estimates of the GDP at constant prices for the third quarter of 2016. The results show that growth reached 1.8% during the third quarter of 2016 compared with the same quarter of 2015.

This is also in line with the growth plateau seen since 2010 with average annual growth reduced at an average of 2.6 percent compared to 6.5 percent for 2000-2009. Although the sectoral composition of the GDP did not change during the period, there have been slight but interesting changes. The share of the construction doubled while ICT lost power. At the same time, health sector grew 100% along with the construction. It is promising to realize that the share of the public sector went down from 14 to 11%. At the level of production sectors, most economic sectors have shown positive growth during the third quarter of 2016 compared with the third quarter of 2015. According to the report, the Electricity and Water Sector has achieved the highest growth rate at 6.3% in the third quarter of 2016 compared with the same period of 2015 at market constant prices, followed by the Finance, Insurance & Real Estates and Business Services Sector at 4.2%, then the producers of private non-profit services to households Sector by 4.0%, then Social and Personal Services Sector at 3.8%, then the Transport, Storage & Communications Sector at 3.0%, followed by Agricultural at 2.9% (Department of Statistics, 1.8% GDP growth rate at constant prices in the third quarter of 2016 Compared with the same period of 2015, 2017).

Unfortunately, the region was impacted by external factors started as of 2010 such as economic effects of Arab Spring by the closing trade routes with Iraq and Syria as well as Syrian refugee inflow. An unexpected sharp increase in the population and side effects of the political circumstances caused serious struggles against GDP/capita increase.

Figure 4. Sectoral composition of GDP 2006 vs 2013 (%) (Jordanian Government, 2014)

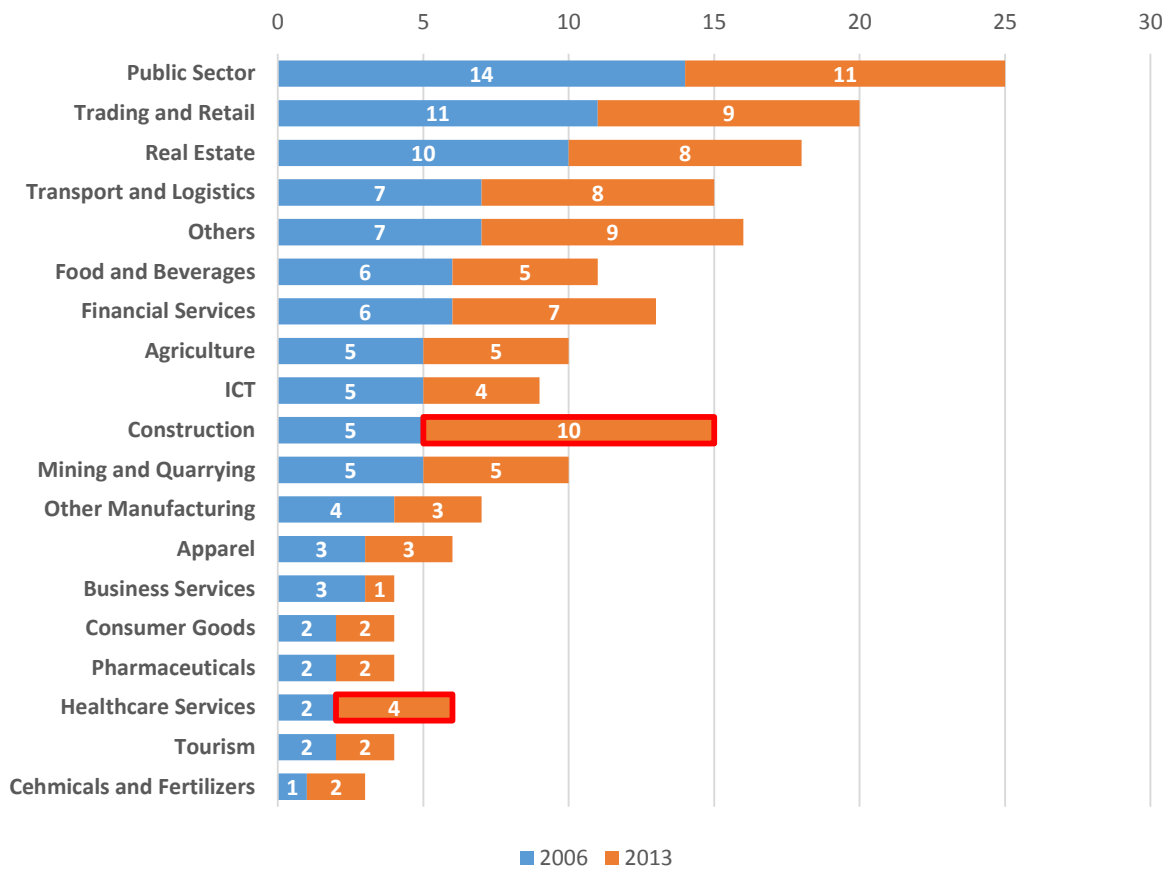
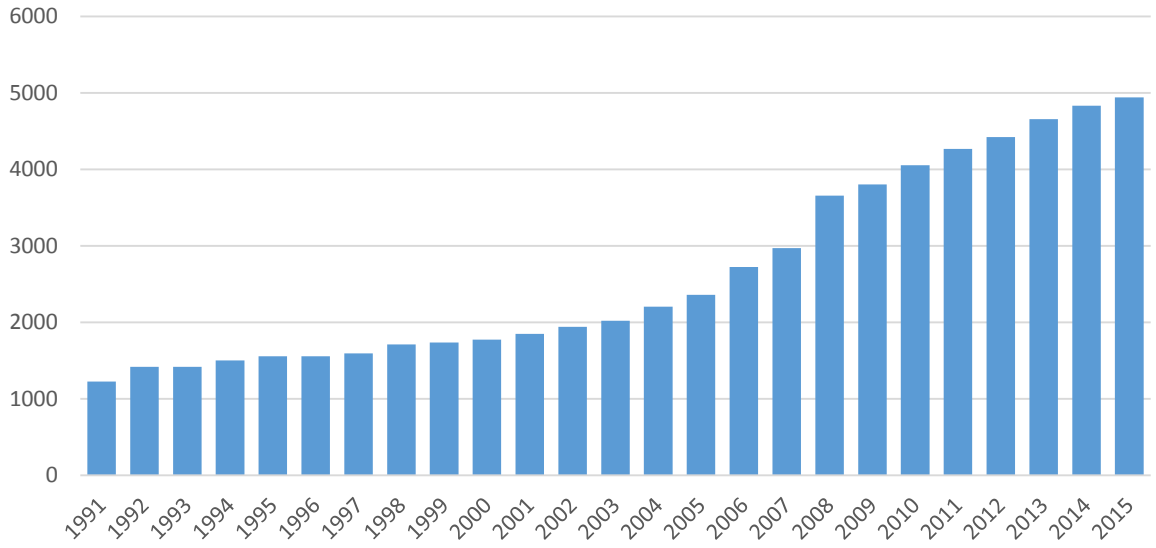


Figure 5. GDP per capita in current USD, (The World Bank, 2016)



Growth

2016 (1.8% at constant prices), the Finance, Insurance, Real Estates and Business Services Sector has contributed by 0.82 percentage point of the total achieved growth rate followed by the Transport, Storage & Communications Sector at 0.42 percentage point then, the personal and social services sector has contributed at 0.17 percentage point , the electricity and water sector at 0.16 percentage point, then net tax on products sector by 0.15 percentage point, while manufacturing industries sector and the Wholesale , Retail Trade, Restaurants &Hotels have contributed at 0.11 percentage point (Department of Statistics, 1.8% GDP growth rate at constant prices in the third quarter of 2016 Compared with the same period of 2015, 2017).

Over the past decade, large sums of government resources have been allocated to support the development of the private sector across a number of industries and sectors seen as engines for growth and job creation. As a result of these investments and the success of Jordan private sector, the Jordanian economy is more diversified than many neighboring economies in the Middle East.

To maintain and strengthen the diversity in Jordan economy, it is necessary to continue to develop the export-potential of its economic sectors and activities with comparative advantages at the regional and global levels. Jordan 2025 identified a number of priority sectors for further development and promotion given their export and job creation potential.

There is no doubt that Jordan has achieved high economic growth during the period 2002-2008. This growth, however, did not contribute to reducing poverty and unemployment or bridging the gap between governorates to the desired extent. This highlights the need to focus on improving social indicators rather than assuming that they go hand in hand with growth. Instead, these indicators should be directly measured and adopted as signs of development and goal achievement (Jordanian Government, 2014).

Government institutions, policies and programs have played a central role in the evolution and development of Jordan as a modern nation. Jordan has been subject to waves of immigration that have contributed to population growth in a turbulent regional environment. As a result, the

responsibilities of public institutions have increased. As Government has become larger and more complex, it has also become expensive to manage and sustain. At 31.3% of GDP in 2014, Jordan's public expenditure as a share of the economy is very large by international standards and needs to be reduced and made more efficient.

In this context, Jordan must build on previous efforts that have been undertaken as part of the restructuring of some public sector institutions under Law No. (17) for the year (2014) regarding the restructuring of governmental institutions and departments, under which some institutions were cancelled or merged. The creation of government department and development of Organizational Structures bylaw was also issued in order to create a legislative framework governing the Organizational Structure of the government and regulating the process of creating new institutions or preventing financial and administrative independence.

Where appropriate, one should also look to the private sector to perform some basic functions currently undertaken in the public sector where they can deliver better quality services on a more sustainable financial basis while still being accountable to citizens. According to the Government Effectiveness Index, Jordan's performance has declined during the period 2002-2013 and ranked lower than comparable countries.

New Economic Reform Package

The government is introducing new reforms to stimulate the economy such as those recommended by the newly established Economic Policy Council (EPC). In June 2016, the King established the EPC to identify measures to activate the economy both related to quick fixes with direct impact and to longer term structural policies. The establishment of the EPC is perceived as a serious signal to treat the economy's challenges as a priority. The 15-member council has 8 subcommittees including related to the business environment, startups, laws and regulations, tax reform, small and medium enterprises. The EPC's first recommendations were endorsed by the government in September 2016.

The Jordanian government adopted a new economic reform package in September 2016. Cabinet endorsed the first set of recommendations proposed by the Economic Policy Council to help the government in accelerating growth. The 38 measures, which were effective upon approval, fall into nine categories as presented below (The Jordan Times, Cabinet adopts economic reform package proposed by EPC, 2017).

Startup Financing

- Setup a $100m venture capital fund with the World Bank (WB) and the Ministry of Planning and International Cooperation (MoPIC) in coordination with the Central Bank of Jordan (CBJ), $50m by WB and CBJ to secure additional $50m in 2016.
- CBJ to increase the Jordan Loan Guarantee Corporation (JLGC) JD50m start-up loan guarantee program established in 2016 to JD100m in 2017

Export and Growth Financing

- Allocate JD100m to JLGC for export guarantee program (CBJ/ 2016)
- Banking sector to setup private equity fund of JD150m JD110m from commercial banks and JD40m from Islamic Banks (Banks, CBJ/ 2016)
- Raise allowable guarantee ceiling to JD1m (from JD550,000) for service and industrial loans (MoPIC, JLGC/ 2016)

Capital Market

- Privatize ASE — Public shareholding company (Jordan Securities Commission (JSC)/2017)
- Enable e-trading on ASE (JSC/2017)
- Amend JSC and companies laws to grant securities commission more discretion in issuing instructions to set policy (JSC/2017)
- Enforce corporate governance stipulated in laws on public shareholding companies (JSC/2017)

- Enact Exchange Traded Fund (ETF) and Mutual Funds (JSC/2017)

Microfinance and Insurance

- Furnish banks' lending and loan guarantees with microfinance institutions that successfully complete licensing process as per CBJ regulations (banks, CBJ/2017)
- Incentivize mergers of insurance and microfinance companies (CBJ/2017)
- Enable general partners/limited partners — Investment Limited Partnership (ILP) legal setup. Introduce Investment Limited Partnership (ILP) legal structure in companies
- Allow for enforceability of shareholders' agreements — except for PLCs. Introduce an article in companies' law to allow for annexation and enforceability of shareholders' agreement
- Remove Goodwill Tax. Amend article (3-A7) of Income Tax Law (2014) to remove Goodwill Tax
- Allow for tax deductions on investments in startups. Introduce an article to Income Tax Law (2014) that allows for tax deductions on investments in startups of three-year-old
- Allow for "virtual office" registration. Amend Companies Law to allow for "virtual office" registration
- Create a flat low rate for customs and goods and services tax while reconsidering exemptions
- Align resource allocation with international best practice on compliance vs auditing (5-10 percent) as well as creating specializations within tax department
- Limit tax evasion
- Adopt receipt-based system
- Automate and link services through building an e-database
- Enforce imprisonment for tax evasion

- Encourage payment of outstanding tax dues through adopting incentive settlement program.

Lower Cost of Compliance for SMEs:

- Allow semi-annual reporting
- Cash-based accounting (vs accrual), for applicable sectors
- Automate legal case assignment processes within judicial system (assign commercial cases to specialized judges)
- Train employees on proper use of judicial police license (law enforcement authority)
- Facilitate company insolvency
- Amend legal notification process (electronic)
- Create tax clearing house

SME Financing

- Endorse Movable Assets Law (2016) — activate the existing law through issuing by-law and withdraw the draft law from parliament for review.
- Allow banks to give out direct loans to SMEs under CBJ's refinancing program (immediately)
- Allocate 15 percent of the soft loans extended by international and regional financial institutions to SME's startups (CBJ/2016)

Governorate Financing

- Decrease the CBJ's refinancing program rate from 1.75 percent to 1 percent for projects located outside Amman (immediately)
- Expand the maturity period of the CBJ's refinancing program (immediately)

Financial Instruments

- Expand the "Issuing of Savings Bonds" campaign to include Jordanian expats as well as locals (Ministry of Finance (MoF), CBJ/2016)
- Expand the "Issuing of Islamic Sukuk" target market to include individuals (MoF, CBJ/2016)

Overarching Economic Legislative Framework

- Ensure economic rights of private sector interaction with government are clear and met
- Exempt Social Security Investment Fund and Securities Commission from Civil Service by-law (hiring procedures)
- Re-engineer, digitize and outsource (when possible) business related processes. Project to commence with top 10 business related to government processes
- Reach out to Gulf Cooperation Council to secure accreditation and recognition of Jordanian professional
- service qualifications (ex: auditing, accounting, engineering and architecture)
- Enable low-cost carriers (LCCs). Develop Marka Airport through private sector BOT participation to become Amman's primary airport for LCCs.

Unemployment

According to the quarterly report on unemployment rate by The Department of Statistics, the unemployment rate has reached 15.8% during the third quarter of 2016. The rate has been

declared as 13.8% for males while it was 25.2 % for females for the same quarter. The increase in the rate for males is by 2.7% points and by 0.1% points for females in comparison to the same period of 2015.

The survey results show that the unemployment rate is high among the university degree holders (Bachelor degree and higher divided by labor force for the same educational level) by 22.4% compared with the other educational levels.

The results also show that 55.8% of the unemployed are secondary certificate holders and higher, and that 44.2% have less than secondary school qualifications. Male unemployed percentage of bachelor holders and higher was 26.5% against 79.4% for females which is varied according to educational level and sex.

The highest rate of unemployment was recorded in Aqaba at 19.8% and the lowest rate was recorded in Zarqa Governorate at 11.4% (Department of Statistics, 15.8% The Unemployment Rate during the third Quarter of 2016, 2016).

Table 2. Work, employment and vulnerability (UNDP, Human Development Indicators, 2017)

Employment to population ratio (% ages 15 and older)	36.3
Child labour (% of ages 5 to 14)	1.6
Domestic workers, female (% of total employment)	2.2
Domestic workers, male (% of total employment)	0.2
Employment in agriculture (% of total employment)	2
Employment in services (% of total employment)	80.5
Labour force participation rate (% ages 15 and older)	41.6
Labour force with tertiary education (%)	n.a.
Long term unemployment rate (% of the labour force)	4.3
Mandatory paid maternity leave (days)	70
Total unemployment rate (% of labour force)	12.2

Vulnerable employment (% of total employment)	9.7
Youth not in school or employment (% ages 15-24)	N/A
Youth unemployment rate (% of labour force ages 15-24)	29.3

The labor force participation rate (LFPR) remains low and decreasing at 36.2 percent during the first three quarters of 2016 (compared to 37.1 percent for the same period of 2015), with female participation at 13.1 percent against 59.0 percent for males. Geographically, Irbid and Maan registered the highest unemployment rate over the first three quarters of 2016 at 17.7 percent each compared to 12.9 percent registered in Amman. All governorates suffered from increasing unemployment rates between the first three quarters in 2015 and the first three quarters 2016 except for Madaba whereby the average unemployment rate registered there declined by 0.1 percentage points to reach 13.8 percent (The World Bank, 2016).

Job Creation

The Government has been focused on job creation for Jordanians as well as Syrian refugees as part of its development plans and agreement with the international donor community. With signs of social pressures building, the government announced an 8-point plan to address unemployment including allocating funds for entrepreneurial projects by youth. The government has also been supporting a number of regional development packages to stimulate job creation in Ajloun, Madaba, Zarqa, Maan and Aqaba with a focus on development programs, infrastructure support and funds to support Small and Medium-sized Enterprises (SMEs).

In Madaba for example, government spending on development programs reached JD 58.3 million in 2016 by end-August with development projects in Zarqa supported by JD 115 million, JD 112 million for Maan and JD 244 million in Aqaba (The Jordan Times, Government spends JD115 million on development projects in Zarqa, 2016) (The World Bank, 2016). In parallel, part of the Jordan Compact aims to turn the refugee crisis into a development opportunity which is expected to foster some job creation for Jordanians and Syrians. This is based on new market

opportunities related to the relaxation of the European Union's (EU) rules of origin, which entered into effect in July 2016 for an initial period of 10 years. This agreement allows exports from 18 special economic zones (SEZs) in Jordan to access the EU for a specified number of product lines such that at least 15 percent of labor is from Syrian refugees. With a number of reforms aimed at improving the labor market, investment climate, and investment promotion, new investments are expected, particularly from investors already familiar with Jordan.

The government is delivering on its pledge to facilitate the issuance of work permits for Syrian refugees, although take-up has been slower than expected. In April 2016, the Government of Jordan introduced a three-month period for Syrian refugees to obtain work permits for free from employers in the informal sector. This measure was expected to regularize the employment of Syrian refugees and help them access legal employment as few met requirements to be afforded a work permit before 2016. At 13,000 work permits issued by this time, take-up of work permits by Syrian refugees was slower than expected and the waiver was extended a further three months. A number of concerns plague Syrian refugees from seeking work permits.

First, most Syrian refugees work by taking on casual and informal jobs which can no longer be possible once a permit is obtained. Moreover, having a permit necessitates an employer willing to support the contract which is not usually the case in the sectors in which Syrian refugees are mostly working, namely: construction, hospitality, cleaning and agriculture. Second, permits require workers to be legally tied to their employers. Third, from a monetary perspective, some refugees fear the loss of the financial aid they are receiving from UNHCR upon obtaining a work permit, despite assurances from UNHCR that those eligible for assistance would not be disqualified from receiving it. Syrian refugees also fear potential renewal fees that they would be subject to annually (The World Bank, 2016).

Table 3. Income/Composition of Resources

Gross national income (GNI) per capita (2011 PPP$)	11,365.2
Consumer price index (2010=100)	115.4

Domestic credit provided by financial sector (% of GDP)	111.9
Domestic food price level index	4.5
Domestic food price level volatility index	6.1
External debt stock (% of GNI)	71.9
Gross domestic product (GDP) per capita (2011 PPP $)	11,406.5
Gross domestic product (GDP), total (2011 PPP $ billions)	73.7
Gross fixed capital formation (% of GDP)	27.2

Table 4. Poverty

Multidimensional Poverty Index (MPI), HDRO specifications	0.004
Population in multidimensional poverty (%)	1.2
Population in multidimensional poverty, headcount (thousands)	85
Population in multidimensional poverty, intensity of deprivation (%)	35.3
Population in severe multidimensional poverty (%)	0.1
Population living below income poverty line, PPP $1.25 a day (%)	0.1
Population near multidimensional poverty (%)	1
Working poor at PPP$2 a day (% of total employment)	4

Social Climate

Education

Primary, secondary, and tertiary gross enrolment rates are somewhat comparable to the rates in comparator countries, but there are considerable within-country differences by governorate and gender. Enrolment in basic education is near universal across all governorates (average national **Gross Enrollment Ratio, GER**, of 99.4 percent). In terms of the kindergarten GER, there

is a more than twenty percentage point gap between the top governorate Maan (GER of 52 percent) and the bottom governorate Mafraq (GER of 30 percent).

Table 5. Education Indicators

Expected Years of Schooling (years)	13.5
Adult literacy rate (% ages 15 and older)	97.9
Gross enrolment ratio: pre-primary (% of preschool-age children)	34.2
Gross enrolment ratio, primary (% of primary school-age population)	98.4
Gross enrolment ratio, secondary (% of secondary school-age population)	87.8
Gross enrolment ratio, tertiary (% of tertiary school-age population)	46.6
Mean years of schooling (years)	9.9
Population with at least some secondary education (% aged 25 and above)	74.1
Primary school dropout rate (% of primary school cohort)	2.1
Primary school teachers trained to teach	n.a.
Public expenditure on education (% of GDP)	n.a.
Pupil-teacher ratio, primary school (number of pupils per teacher)	19.9

More than half of schools in Jordan are run by the Ministry of Education (MOE), with the private sector playing a sizeable role in Amman especially. Schools in Jordan are run either by the Ministry of Education; other governmental entities (such as the Ministry of Religious Endowments, Ministry of Higher Education, Ministry of Social Development, and Ministry of Defense); the private sector; or the United National Relief and Works Agency (UNRWA), which runs schools for Palestinian refugees. Public schools are co-educational only through grade 4 (and in some communities, only through grade 2) after which girls are taught in separate schools predominantly by female teachers and boys by male teachers. Jordan had a total of 6,614 schools in academic year 2013-14, of which 3,694 (or 56 percent) were run by the Ministry of Education and 2,708 (or 41 percent) by the private sector. Other governmental

entities were only in charge of a total of 38 schools, and UNRWA administered 174 schools. The share of MOE-administered schools in total number of schools is highest in Mafraq at 87.9 percent, and lowest in Amman at 36.7 percent. Amman has by far the highest share of private schools amongst all governorates, amounting to 58.8 percent of all schools.

Based on the calculations available years of TIMSS (Trends in International Mathematics and Science Study) and PISA (Program for International Student Assessment), average student performance as measured in international learning assessments is also relatively low. Figures show Jordan's below-average performance in international mathematics, science, and reading assessments. International mathematics achievement of Jordan Grade 4 students was measured as 388 where Grade 8 students scored 386. The baseline by TIMSS is 500 for this class (International Association for the Evaluation of Educational Achievement, 2015).

Although it outperforms other MENA countries in mathematics and science, gains have been relatively small and unsteady. In addition, over half of 12th grade students fail the tawjihi, the secondary school leaving exam.

Many university graduates are out of work and there is a lack of skilled technicians. Youth unemployment stands at around 30 percent. The outlook for job creation for more educated Jordanians is bleak. Out of the 13,498 jobs lost by Jordanians between 2007 and 2014, 37.8 percent had bachelor degrees and above and 25.4 percent had secondary level education (International Association for the Evaluation of Educational Achievement, 2015). Job prospects improved for Jordanians with basic education only. This depicts shifts in the labor market dynamics in Jordan. According to World Bank estimates, additional years of education are negatively correlated with full-time employment and positively associated with having a public sector job. These relationships call into question expected patterns of returns on education.

Wide disparities in educational outcomes by socioeconomic status, gender, and geography limit social mobility. The Program for International Students Assessment's (PISA) figures in 2015, points to students in the top 20 percent income bracket outperforming those in the bottom 20 percent by a large margin in PISA. The tawjihi pass rates, which determine access to university

education, are generally low in the public sector (51.4 percent, with 1,289 secondary schools participating compared to 65.1 percent in 173 private schools). They also vary by governorates, location, school ownership, and gender. These pass rates, while indicative, do not control for the different factors at play and their individual association with pass rates. They also do not allow for an assessment of the potential correlation with school size, class size, or student-teacher ratio. Results of regressing the tawjihi pass rates on different school characteristics. The largest negative association with tawjihi pass rates is found with residing in Aqaba, Jarash, Maan, Madaba, or Zarqa (by comparison with Amman); attending a rented school, as opposed to a school owned by MOE; and attending a male school, as opposed to a female school. In summary, pass rates for the secondary school leaving exam are not associated with school size, class size, and student teacher ratio, while being negatively correlated with location in certain governorates, male schools, and rented schools.

In its report published on August, 2016, Human Rights Watch indicates that more than one-third of school-aged Syrian children registered with the United Nations refugee agency in Jordan – over 80,000 out of 226,000 children – were not in formal education during the last school year. The public system has been severely strained as it provides thousands of Syrian refugee students with access to education at all levels. The drive to accommodate as many students as possible within existing infrastructure constraints has led to increases in the number of double-shift schools, reducing instructional time for all students.

Table 6. Health indicators

Life expectancy at birth	74
Adult mortality rate, female (per 1,000 people)	96
Adult mortality rate, male (per 1,000 people)	131
Deaths due to malaria (per 100,000 people)	n.a.
Deaths due to tuberculosis (per 100,000 people)	0.5

HIV prevalence, adult (% ages 15-49), total	n.a.
Infant mortality rate (per 1,000 live births)	16
Infants lacking immunization, DTP (% of one-year-olds)	1
Infants lacking immunization, measles (% of one-year-olds)	3
Public health expenditure (% of GDP)	7.2
Under-five mortality rate (per 1,000 live births)	18.7

Table 7. Inequality

Inequality-adjusted HDI (IHDI)	0.625
Coefficient of human inequality	16.4
Income inequality, Gini coefficient	33.7
Income inequality, Palma ratio	1.4
Income inequality, Quintile ratio	5.1
Inequality in education (%)	16.9
Inequality in income (%)	20.5
Inequality in life expectancy (%)	11.9
Inequality-adjusted education index	0.586
Inequality-adjusted income index	0.568
Inequality-adjusted life expectancy index	0.732
Overall loss in HDI due to inequality (%)	16.5

Table 8. Gender

Gender Development Index (GDI)	0.86
Adolescent birth rate (births per 1,000 women ages 15-19)	26.5
Estimated gross national income per capita, female (2011 PPP$)	3,586.6

Estimated gross national income per capita, male (2011 PPP$)	18,830.7
Expected years of schooling, female (years)	13.7
Expected years of schooling, male (years)	13.3
Gender Inequality Index (GII)	0.473
Human Development Index (HDI), female	0.674
Human Development Index (HDI), male	0.784
Labour force participation rate, female (% ages 15 and older)	15.6
Labour force participation rate, male (% ages 15 and older)	66.6
Life expectancy at birth, female (years)	75.8
Life expectancy at birth, male (years)	72.4
Maternal mortality ratio (deaths per 100,000 live births)	50
Mean years of schooling, female (years)	9.3
Mean years of schooling, male (years)	10.5
Population with at least some secondary education, female (% ages 25 and older)	69.5
Population with at least some secondary education, male (% ages 25 and older)	78.5
Share of seats in parliament (% held by women)	11.6

Table 9. Human security

Homicide rate (per 100,000 people)	2
Birth registration (% under age five)	99
Homeless people due to natural disaster (average annual per million people)	0
Old age pension recipients (% of statutory pension age population)	42.2
Prison population (per 100,000 people)	95
Refugees by country of origin (thousands)	1.6
Suicide rate, female (per 100,000 people)	1.9

Suicide rate, male (per 100,000 people)	2.2
Violence against women ever experienced (%)	23

Technological Climate

Jordan's start-up sector is poised for major growth in the coming years, with the kingdom standing as one of the largest and most dynamic tech hubs in the MENA region, supported by government policy and, increasingly, private sector investment into tech entrepreneurship.

Jordan has more than 600 tech companies, one of the leading among Arab countries, of which more than 300 are start-ups . Active across a host of sectors, including software development, business solutions, finance, health and games, the kingdom's start-up culture benefits from broader growth within the ICT industry and tech exports expanded eight-fold between 2001 and 2013 (Asian Century Institute, 2015).

Government support has been critical for start-up success, with King Abdullah II launching what would become the region's largest seed investment company, Oasis500, in 2010. First-round funding at Oasis500 is set at between $30,000 and $50,000 for the tech sector, and $31,000 for cultural and creative industries, with start-ups able to apply for a second round of investment with the company. Over 100 start-ups have benefitted from a relationship with Oasis500 since it was launched, as the company offers entrepreneurship training, mentorship and guidance, business incubation and acceleration, and follow-on investment and funding.

The private sector is also increasingly involved in Jordan's start-up scene, with a number of private firms launching programmes. For example, telecoms operator Zain Jordan launched the Zain Al Mubadara programme, which supports young tech entrepreneurs; Amman-based Hikma Pharmaceuticals announced that it had launched a $30m fund through its investment arm, Hikma Ventures, devoted to health care start-ups; and Orange Jordan launched BIG, an accelerator programme aimed at young tech entrepreneurs.

There are a number of notable success stories within the ICT sector. IrisGuard, for example, manufactures iris biometrics and iris-recognition camera systems for commercial and government clients, with the UN High Commission for Refugees adopting this technology to register Syrian refugees in Jordan. Another is Globitel, a Jordanian telecoms and contact centre solutions firm, now offering services in more than 35 countries. The company provides a variety of product lines including roaming, value-added services, and network and customer care solutions to telecoms providers, financial service providers, contact centres, government, and the education and health care sectors.

Other companies like sharia-compliant crowdsourcing platform liwwa have also chosen Jordan to launch their operations, recognising the benefits offered to entrepreneurs in the kingdom.

A recently launched roadmap for the development of Jordan's ICT sector aims to attract capital inflows on the back of recent government moves to reduce the tax burden on companies operating in the industry.

In November 2016, the Ministry of Information and Communication Technology (MoICT) , unveiled the REACH 2025 initiative, which aims to turn Jordan into a regional ICT centre and give it greater "relevance in global value chains".

As part of the initiative, the Ministry of Information and Communication Technology (MoICT) and the ICT Association of Jordan (int@j) will work in conjunction with the private sector to bolster competitiveness, human resource development, access to finance, investor incentives and IT development.

The MoICT expects total sector revenues to increase by 25-30% through to the end of the programme, from around $2bn in 2014. This growth will be supported by the 5000-7000 new businesses the initiative hopes to help create by 2025, which is expected have the knock-on effect of generating between 130,000 and 150,000 jobs.

This move should be a welcome development given Jordan's unemployment rate of 14.7% in the second quarter of 2016, according to data released by the Department of Statistics

(Department of Statistics, 15.8% The Unemployment Rate during the third Quarter of 2016, 2016).

However, under REACH 2025 – which builds on an earlier REACH programme that ran from 1999 to 2005 – the digital economy is not expected to boost GDP until 2019, when the enabling environment is fully in place.

Prospects for the completion of the new programme seem to be positive as Jordan's ICT sector is one of the most developed and robust in the region, driven by 15 years of industry-friendly policy and a young, well-educated and growing population of digital consumers.

According to a December 2015 report by the Asian Century Institute, ICT is a major economic contributor and has seen its contribution to GDP grow from 9.7% in 2006 to 12% today.

The sector has also experienced a surge in mobile penetration and internet usage on the back of strong demand for data. In the first quarter of 2016, Jordan posted a mobile penetration rate of 148%, according to the Telecommunications Regulatory Commission (TRC). The TRC also reported that internet access in the first three months of the year had reached 84%, or 8.1m users, up from 76% in the same quarter in 2015 and 36% in 2008.

Although Jordan's ICT sector has been built on a solid foundation, industry stakeholders have voiced their concerns regarding certain shortfalls, such as access to finance, investor incentives and tax exemptions. Historically, the country's ICT sector has faced a heavy tax burden, which was exacerbated by the decision to double industry taxes in 2013.

The government has since moved to ease the tax burden by announcing a series of incentives to boost the sector in April 2016, including a sales tax and Customs duty exemption for all services related to software development, mobile applications, website portals, outsourcing, digital content and electronic games, IT training and e-learning.

Under this new series of reforms, goods and services taxes for ICT-related services will have a zero sales tax rate, while income tax on the same services will be lowered from the current 20%

to 14%. As part of this move, the government also lifted all minimum capital requirements for foreign investors eyeing the ICT sector, making the country more appealing.

REACH 2025 intersects with the country's National ICT Strategy, which runs from 2013 to the end of 2017 and focuses on using ICT as a tool to encourage economic growth and job creation.

The National ICT Strategy identifies four strategic targets to be met by 2017, including achieving $450m in IT investment, reaching $3.15bn in revenues for a 30% expansion over 2012, pushing IT-specific employment up by 30% from 2012 levels to hit 20,000 and bolstering internet penetration to 85%.

The kingdom will be hoping that with its recently enacted tax incentives, both the National ICT Strategy and REACH 2025 will further encourage both domestic and foreign investment in 2017, which should in turn attract private sector expertise to the industry and help Jordan begin to re-establish itself as a regional technology leader (Jordan looks to revitalise its digital economy as an engine of growth, 2017).

R&D and Innovation in the Private Sector

Private sector companies in Jordan are not generally considered innovative in a technical sense, or likely to undertake significant levels of R&D. Exceptions to this rule exist, mostly in the services sector and notably in the ICT sector, including companies such Maktoob.com (Arab internet services company acquired by Yahoo!), D1G (online Arabic community platform), Jeeran (Arabic webhosting community), Rubicon (a provider of e-learning and simulated training material, as well as animation, gaming and themed entertainment), and software developers such as Eskadenia and Kindisoft. Jordan's pharmaceutical and biotechnology sectors are also known to be actively involved in R&D and innovation, including pharmaceutical companies such as Al Hikma and JPM, and Contract Research Organisations (CROs) such as Triumpharma and Pharmquest. Beyond these pockets of R&D and innovation, there is limited evidence of significant levels of investment by private companies in R&D or innovation.

Perhaps the most notable absence of investment in R&D and innovation is in the industrial sector. Unable to compete with low-cost countries in Asia, Jordan's industry leaders realize that they need to develop sustainable competitive advantage through innovation. While the development of niche markets can create short-term growth, sustainable growth can only be achieved through true innovation. As a result, the sector needs to increase the number of engineers and scientists engaged in R&D in order to increase its technical and innovative capacity.

The industrial sector in Jordan has grown in the past 20 years, encouraged by the government through, among other initiatives, the establishment of industrial estates. These estates operate as free-trade zones, and provide companies with infrastructure, business support services and incentives including tax exemptions.

Examples include:

1. Al-Hassan Industrial Estate (Irbid);
2. Al-Hussein Ibn Abdullah II Industrial Estate (Karak);
3. Jordan Cyber City (Irbid);
4. Al-Tajamouat Industrial Estate (Amman);
5. Aqaba Special Economic Zone (Aqaba);
6. El-Zai Ready-wear Manufacturing Company (Zarqa).

By 2009, the industrial sector was estimated to account for approximately 30% of national GDP, with Jordan's relatively advanced pharmaceutical sector producing the main source of high-tech exports. The nascent biotechnology sector, in some cases comprising subsidiary companies of pharmaceutical companies, shows promise as a contributor to Jordan's high-tech exports in the future. Moreover, investments in innovation are typically high risk and have long-term returns, whereas the majority of Jordanian companies are risk adverse and focus on short-term gains.

The vast majority of Jordanian companies are family-owned SMEs that do not typically have a culture of investing in R&D or innovation. Nor do family companies generally invest sizeable amounts in staff development—beyond family members—that would build capacity within their

companies. Family members also hold most senior management positions, sometimes stifling creativity and innovation.

A recent review by the World Bank/Korea RIAL Team for Jordan (April 2010) noted that 95% of private sector companies in Jordan are SMEs, mostly family businesses. The team found that these companies tend to operate in 'undemanding fields', are run in a 'conservative manner', and the culture of risk taking necessary for innovation is limited. Moreover, the team determined a general lack of familiarity with what is required to innovate within many companies.

Beyond this, technical staff are reported often to lack the basic knowledge necessary to conduct effective R&D. In other cases, people possess the technical skills and knowhow, but lack the ability to communicate R&D outcomes or promote their ideas. Presentation, R&D proposal writing and public speaking skills could help to bridge this gap.

In response to the issues confronting the industrial sector, the Chamber offers members training programmes to improve their innovative capacity. Training also includes programmes on business management and other soft skills.

In another initiative, the Chamber has recently signed a memorandum of understanding with the Izmir Chamber of Commerce to establish an 'innovation centre' to help develop the innovative capacity within this sector, one the Chamber considers to show strong growth potential.

Despite the general absence of investment in R&D and innovation in Jordan's industrial sector, there are some notable exceptions. Two companies often cited as innovative companies actively involved in R&D are Petra Engineering Industries, a successful company that designs and manufactures commercial and industrial heating, ventilation and air-conditioning equipment, and the Nuqul Group, a large conglomerate involved in a range of sectors including FMCGs, construction, stationery, automotive, packaging and printing, and paper mills.

The King Abdullah II Design and Development Bureau (KADDB) invests heavily in R&D in the military sector, and is actively developing a manufacturing base in Jordan, including its own

dedicated industrial zone. Although it is not strictly private sector, the KADDB's R&D capacity has been developed through funding sourced from the public defense budget.

Entrepreneurial Innovation

Successful innovation requires the effective and fruitful partnering of the people with ideas with the people who have the necessary business acumen and entrepreneurial skills to successfully take this innovation to market. Incubators, such as iPark, Urdonia Lil Ebda and Oasis 500 (business accelerator), supporting not only the ICT sector, but also work to bridge this gap by developing collaborative networks between the companies located within the incubators and mentors, business consultants and investors, who can help companies commercialize their products and services. They also provide training and support to develop capacity within the companies themselves. The Jordan Technology Transfer Offices Network (JTTON) is another example of linking between innovation and commercialization.

A range of other factors also appear to contribute to the lack of a well-developed entrepreneurial base in Jordan. For example, social or cultural barriers to risk taking, and the importance of financial security and social status play an important role in influencing entrepreneurship in Jordan, and in the Arab world more generally. Other factors influencing the environment for entrepreneurship and innovation in Jordan include:

- A lack of sufficient seed and venture capital, necessary to fund start-up companies seeking to commercialize innovation in addition to Oasis500 of King Abdullah II. In addition, the existing funds are not fully utilized due to lack of exit opportunities.
- The absence of tax incentives, such as tax concessions on R&D expenditures, that would promote greater investment in innovation-generating R&D activities by the private sector;
- High taxation on some sectors of the economy, including the telecommunications sector (estimated to be taxed up to 55% of total revenues)
- University policies and regulations that demotivate faculty from becoming engaged in business development activities, including the difficulty of access to funding, systems for

academic promotion that do not always recognize commercially related activities, the heavy burden of teaching loads, a general lack of mechanisms to advance research activities, and the need to access equipment and laboratory facilities;

- Weak IP implementation processes. This includes judiciary and government patent staff lacking the knowledge and skills necessary to effectively monitor and enforce IP laws. Further to this, Jordan has been slow to implement the Patent Cooperation Treaty, the consequence of which is an increased risk that local patents will be used by others in markets outside Jordan;
- The 'culture' within Jordanian universities is widely reported to be very academically focused, with teaching largely based on lectures and less on practical application of learning;
- Regular changes to laws and regulations governing industry, often reflecting ministerial changes, provide an obstacle to long-term planning for business investment and future growth;
- Banks require high collateral from start-ups, while sophisticated financial products such as venture capital and equity financing are immature or do not exist;
- The brain drain to other countries where people possessing entrepreneurial skills see more potential to succeed—an issue raised by respondents to the survey of Jordan's diaspora conducted by the MoPIC—also reduces entrepreneurial capacity in Jordan. An estimated 236,000 Jordanians currently work in Saudi Arabia, 170,000 in the UAE and 70,000 in Kuwait. While the Jordanian expatriates in the region and the world can contribute to national development, sustainable long term economic development cannot be built by having a large number of the nation's 'best and brightest' work abroad and replacing them with unskilled foreign workers who transfer their savings outside the country. The first priority of Jordanian national education system and labor markets should be to provide meaningful opportunities for Jordanians to work in Jordan (Jordanian Government, 2014).

Despite the impediments that currently stand in the way of entrepreneurs and innovation in Jordan, evidence suggests that the government, industry and academia are increasingly recognizing the need to foster a culture of innovation, creativity and entrepreneurship. To this end, measures are being progressively implemented to encourage the creation of innovation and technology-based businesses (Mahroum, Al-Bdour, Scott, Shouqar, & Arafat, 2010).

B. NCRD Overview

SWOT Analysis

Strengths

- Young and demanding population
- Trading skills and talent taking its roots from a long historical past
- An adaptive entrepreneurship culture with the experience of surviving in difficult market conditions
- Increasing levels of investment made in education
- Leader based society where good role models play an important way out
- Arabic as a common and widely spoken language base for research, technology, innovation and business in the wider region
- English widely used as a second language as means of communication for education, research and business
- A strong intellectual diaspora in other countries
- Connected (floating) societies/countries in the Arabic world
- A promising stable and rather safe eco-system for expatriates
- No visible xenophobia
- Presence of some competitive industries such as pharmaceuticals, ICT and engineering to some extent, as a role model

Weaknesses

- Low average skill level & educational qualifications
- Brain drain, further weakening intellectual capital
- Not competitive salary and benefit packages for well-educated experts, managers (local or international)
- Lack of research culture and incentives

- Insufficient transportation infrastructure (good ones are limited to few lines and destinations)
- Low levels of patenting activities
- Low ranks in ease of doing business index
- Lack of group work
- Lack of multi-discipline approach
- Overdependence of the economy on external financial resources
- Lack of intellectual property (IP) rights and or practice
- Limitations on the formation of a free market
- Perception of high nepotism and corruption
- Low perception on rule of law and democracy
- Lack of a strong middle class
- Limited domestic market size to host foreign direct investment
- Political disputes among countries in the region
- Weak cooperation, collaboration and coopetition culture
- Strong belief and practice supporting that business would be handled from top to bottom
- Lack of written culture
- Too much bureaucracy
- Perception of oligopolistic market behavior where few actors determine and dominate markets, not allowing newcomers to take market share
- Limited experience or will for long-term planning
- Limited SME talent and establishment

Opportunities

- Geographical location advantage; a bridge between east and west
- The region includes emerging markets and inspires new ones
- Recovery in relations with Western world (especially after experiencing detrimental effects of post 9/11 period on people and capital flow, similarly after the Arab Spring)

- Increasing tendency towards global integration in education sector (western universities and research institutions are opening subsidiaries in MENA countries)
- Stock of problems pushing the crowds for solutions
- The strong trend that the major corporations particularly in western societies are facing low growth rate and profitability
- Movement of capital, talent, growth and knowhow from west to east, from developed to developing countries
- Higher rate of return opportunities for international corporations
- Existence of role model countries in the region where the adaptability of the offered model to MENA countries is rather high; Turkey more predominantly and Malaysia to some extent
- Opportunities of privatization
- A substantial market size (the whole region as one large market without any language barrier)
- Opportunities of mergers and acquisitions
- Likeliness of financial incentives to be planned and implemented in the MENA countries by international investors and organizations
- Likeliness of well-designed public policies to foster education and research in the wider region
- Decreasing importance of oil/gas sectors

Threats

- Any new political turmoil in the region might turn into long lasting regional and international wars and conflicts
- Further immigration and influx of population to Jordan
- Further lowering of oil prices, discouraging regional and global actors to consider investing in the region
- Increasing global competition in R&D activity and high-tech sectors

- Emergence of new and strong R&D “centers” with more favorable business conditions (i.e. Turkey, Iran, Malaysia, Chile, Belarus)
- Continuation of brain drain

C. Roadmap and Improvements

The current players, organizations, establishments and other related organs of the Jordan Science, Technology and Innovation (STI) has been investigated and reviewed thoroughly. There found to be 10 major players in the system as in the Jordan STI map prepared by UN ESCWA Technology Center in September 2015 (UN ESCWA Technology Center, 2015).

Research and Development Institutions

- Royal Scientific Society: Research Centers
- Higher Council for Science and Technology
- National Energy Research Center
- Royal Botanic Garden
- Water and Environmental Research and Study Center, University of Jordan (UoJ)
- National Information Technology Center
- Natural Resources Authority
- Petra University Animal Care Unit
- Petra University Pharmaceutical Center
- National Center for Agricultural Research and Extension
- Queen Rania Center for Jordanian Studies & Community Services, Yarmouk University
- Synchrotron Light for Experimental Science and Applications in the Middle East SESAME
- Center of Excellence for Innovative Projects, Jordan University of Science and Technology (JUST)
- King Hussein Institute for Biotechnology and Cancer
- Center for Strategic Studies, UoJ
- National Center for Human Resources Development
- National Center for Diabetes, Endocrinology and Genetics

- Princess Haya Biotechnology Center at JUST
- National Center for Research and Development
- Hamdi Mango Center for Scientific Research - UoJ
- Pharmaceutical Research Centre, JUST
- Al Urdun Al Jadid Research Center
- King Hussain Cancer Center
- Cell Therapy Center, UoJ

Policies, Strategies and Legislations

- Jordan 2025
- Jordan National ICT Strategy 2013-2017
- National Policy & Strategy for STI 2013-2017
- National Medical Biotechnology Strategy
- Master Strategy of Energy Sector in Jordan 2007-2020
- Jordan Education Initiative (JEI)

Industrial Sector

Industrial Representatives

- Chamber(s) of Industry
- Jordan Chamber of Industry

Industrial Clusters

- ICT cluster
- Pharmaceutical Cluster
- Fertilizer Chemical Cluster
- Health Care and Services Cluster
- KADDB Industrial Park

- King Abdullah Industrial Estate
- Health Care & Services Cluster

Technology Transfer Offices

- Philadelphia University
- University of Petra
- Amman Chamber of Industry
- Jordan Industrial Estate Corporation
- Al Urdonia Lil Ebda
- King Abdullah II Fund for Development
- University of Jordan
- Intellectual Property & Commercialization Office, RSS
- National Center for Agricultural Research and Extension,
- Jordan University of Science & Technology
- National Center for Research & Development, HCST
- Hashemite University
- Al Balqa' Applied University
- Princess Sumaya University for Technology
- German Jordanian University
- Jordan Enterprise Development Corporation
- Yarmouk University
- Jordan Technology Transfer Offices Network (JTTON)
- Jarash Private University
- Ajloun National University
- Mu'tah University

Academia

Colleges

- Alquds College
- Colleges at Al Balqa'a Universities
- Arab Community College
- Khawarizmi College
- Prince Faisal Technical Collage

Public Universities

- Al-Hussein Bin Talal University
- Al-Balqa' Applied University
- German Jordanian University
- Al Al-Bayt University
- Tafila Technical University
- The Hashemite University
- University of Jordan
- Yarmouk University
- Jordan University of Science and Technology
- Mu'tah University

Private Universities

- Applied Science Private University
- Arab Open University
- Columbia University Global Center
- The World Islamic Sciences & Education University
- Princess Sumaya University for Technology
- Aqaba University of Technology

- Al-Ahliyya Amman University
- Al-Zaytoonah University of Jordan
- Amman Arab University
- Irbid National University
- Ajloun National Private University
- Talal Abu-Ghazaleh University
- Philadelphia University
- Jerash Private University
- Jordan Academy of Music
- Jadara University
- Middle East University
- Petra University
- Zarqa University
- Isra University

STI Financial Support

Awards

- Hi jawi Award for Applied R&D
- El Hassan bin Talal Award for Scientific Excellence
- Queen Rania National Entrepreneurship Competition
- King Abdullah II Award for Youth Innovation and Achievement
- Bank Al Ethad SME Awards

Investments

- Accelerator Technology Holdings
- Catalyst Private Equity
- Foursan Equity

- iMENA
- Riyada Enterprise Development
- Accelerator Management Company
- MENA Venture Investments
- Jabbar Internet Group
- Oasis 500
- Silicon Badia
- Interactive Ventures Holdings
- Endeavor Jordan
- Dash Ventures

Funds

- Islamic Development Bank
- European Union - including the SRTD
- Industrial Research and Development Fund
- Scientific Research Support Fund
- Middle East Partnership Initiative
- European Bank for Reconstruction & Development
- Development & Employment Fund
- Jordan Forum for Business and Professional Women
- Jordan Enterprise Development Corporation, JEDCO
- Canadian International Development Agency CIDA
- National Fund for Enterprise Support
- King Abdullah II Fund for Development
- Abdul Hameed Shoman Fund for Supporting-
- Scientific Research
- Horizon 2020
- Applied Scientific Research Fund

- USAID

Grants

- Swiss Agency for Development and Cooperation
- European Bank for Reconstruction & Development
- German Agency for Technical Cooperation
- Japan International Cooperation Agency

Business Sector

Incubators and Accelerators

- iPark
- Ibda3: Zain
- Oasis 500
- Young Entrepreneurs Association
- Jordan Innovation Center at Philadelphia
- Wamda Capital
- Al Urdonia Lil Ebda
- South Business Incubator Centre
- Jordan Forum for Business & Professional Women
- The Tank - Umniah - KHBP
- MENA Apps
- The Technological Incubator (JUST)
- Agro Industry Business Incubator
- Copiatec / Biotechnology Incubator at Mafraq Development Company

Business Representatives

- Jordan Chamber of Commerce
- Chamber(s) of Commerce

- Jordan Engineers Association
- Jordan Enterprise Development Corporation
- Information Technology Association of Jordan (Int@j)
- Institute of Management Consultants & Trainers
- Architects and Engineers Business Council
- Business Men Society

Business Clusters

- Cyber City Jordan
- King Hussain Business Park

STI Related Ministries

- Ministry of Education
- Ministry of Health
- Ministry of Environment
- Ministry of Higher Education & Scientific Research
- Ministry of Information and Communication Technology
- Ministry of Energy and Mineral Resources
- Ministry of Finance
- Ministry of Industry and Trade
- Ministry of Agriculture
- Ministry of Water & Irrigation

Science Clusters

- Associations of Arab Universities
- Jordan Medical Association

- Jordan Pharmaceutical Association
- Jordanian Geologists Association
- Jordan Association for Pharmaceuticals Manufacturers
- Federation of Arab Scientific Research Council
- Jordan Engineers Association
- Jordan Dental Association
- Agricultural Engineers Association

STI Support: Organizations, Programs, Initiatives, Calibrations and Certifications Bodies

STI Support Organizations

- Robotics and Intelligent Automation Innovation Centre of Excellence
- United Nations Industrial Development Organization
- King Abdullah II Design and Development Bureau KADDB
- Royal Scientific Society
- Higher Council for Science and Technology
- Jordan Enterprise Development Corporation
- Jordan Society for Scientific Research
- Queen Rania Centre for Entrepreneurship
- Intellectual Property Commercialization Office
- National Center for Innovation
- International Development Research Center
- Jordan Competitiveness Program (JCP- USAID)
- Young Entrepreneurs Association
- Business Development Centre
- National Information Technology Center
- UN ESCWA Technology Center

- Microsoft Innovation Center
- Islamic Development Bank
- Department of Statistics
- Jordan River Foundation
- World Bank
- Orange Jordan
- UNESCO

Certification and Calibration Bodies

- SGS
- LLOYDS
- Jordan Food & Drug Administration
- Jordan National Metrology Institute
- Jordan Institute for Standards & Metrology

STI Support Programs and Initiatives

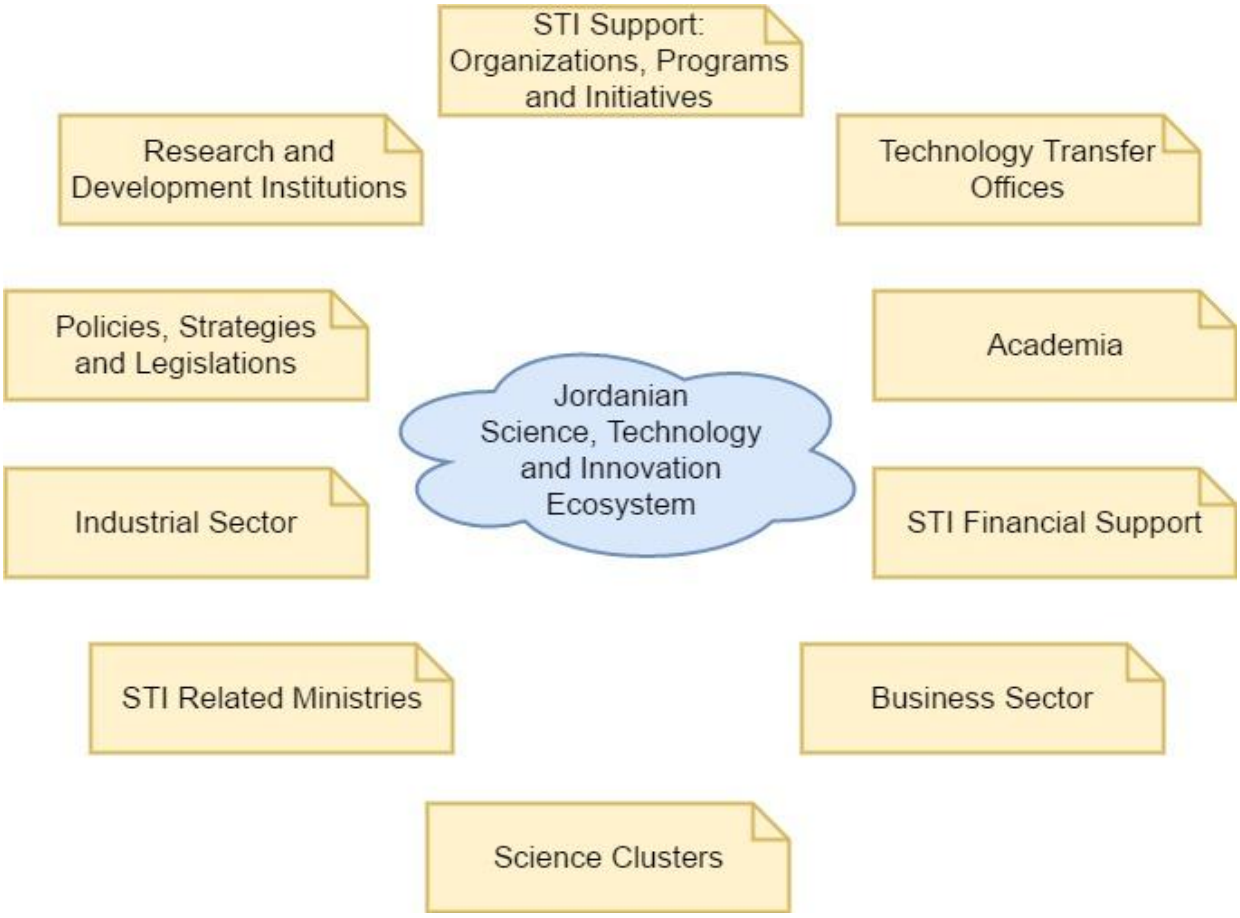
- Jordan Competitiveness Program, USAID
- Civilian Research & Development Foundation
- Faculties for Factories program
- Support to Research & Technological Development
- United Nations Development Program
- Jordan Technology Transfer Offices Network
- United Nations for Environmental Program UNEP
- Jordan Innovation Centers Network
- Jordan Forum for Business and Professional Women
- Education Reform for the Knowledge Economy, (ERfKE) Program
- European Union (JUMP, JSMP, JordanNet)
- Bedaya Angel Network

- European Enterprise Network
- Jordan Education Initiative (JEI)
- Microsoft Bizspark
- In jaz
- Zee Lunch Pad

Eco-System

All these major groups that NCRD has or related to, form a very comprehensive and powerful system of sources and stakeholders. Insightful overviews of the current players in Jordan indicate a very high potential eco-system. Fundamentals of science can be produced by means of academic units. Fundamental science can be changed into technology by means of research and development institutes. Once the technology is developed as a blueprint, it would require to be engineered by means of R&D funding. There are STI financial support mechanisms available along with the international organizations support such as World Bank and UNDP. As a matter of fact, STI related development process and the required organs do exist in the system. However, and most importantly, given maps do not provide a roadmap in an interaction web. In other words, all the pillars of comprehensive STI eco-system in Jordan provide a perception such that they are standalone excellency centers of no interaction, of no distributed processors, of no shared mission or of no co-ordination. Even the perception is biased or may not be true, such a wonderful gathering of organic units should be co-missionized.

Figure 6. Current state of Jordanian STI eco-system



Silicon Valley today in CA, USA, is a region of San Francisco and its south where a collection of many components have grown naturally. The region was not subject to a targeted and coherent plan to be changed into today's situation. Nevertheless, there are many instances of unnatural but Silicon Valley like systems that were built in a controlled and well planned environment including and for mostly in the United States, numerous examples of which are now can be said to be very successful.

It is very interesting to have a glance at the value flow map in STI all over the world. The interaction mostly is between the USA and Far East. In the MENA region including the Europe is doing mostly inflow and has very weak links in the chain. Especially, Middle East and North Africa almost does not exist in this flow.

A careful and insightful investigation on how far eastern countries were able to achieve to take place in this value flow is not very striking. In well planned STI environments as part of a

development plan, what they did best is to create an eco-system of components which today's Jordan already has.

In China, Japan, South Korea, Singapore and Malaysia, unavoidable and must to have components of the eco-system are listed as follows:

- Market
- Capital
- Human Resources
- Culture
- Infrastructure
- Regulations

Figure 7. Foreign value added selected flows, by source country/region, USD millions, at current prices, 1995 (OECD-World Trade Organization, 2013)

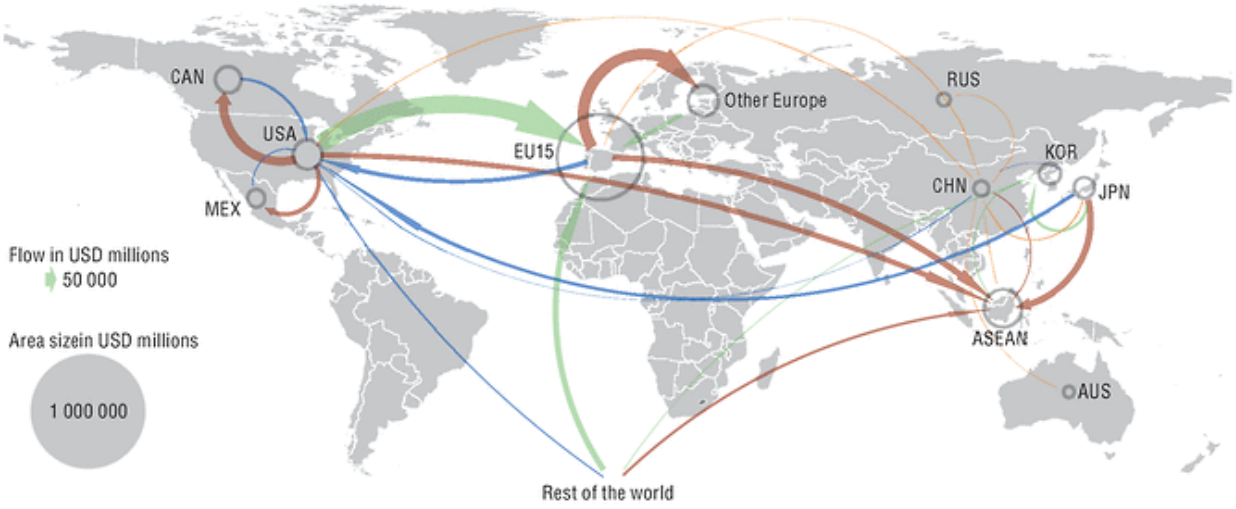
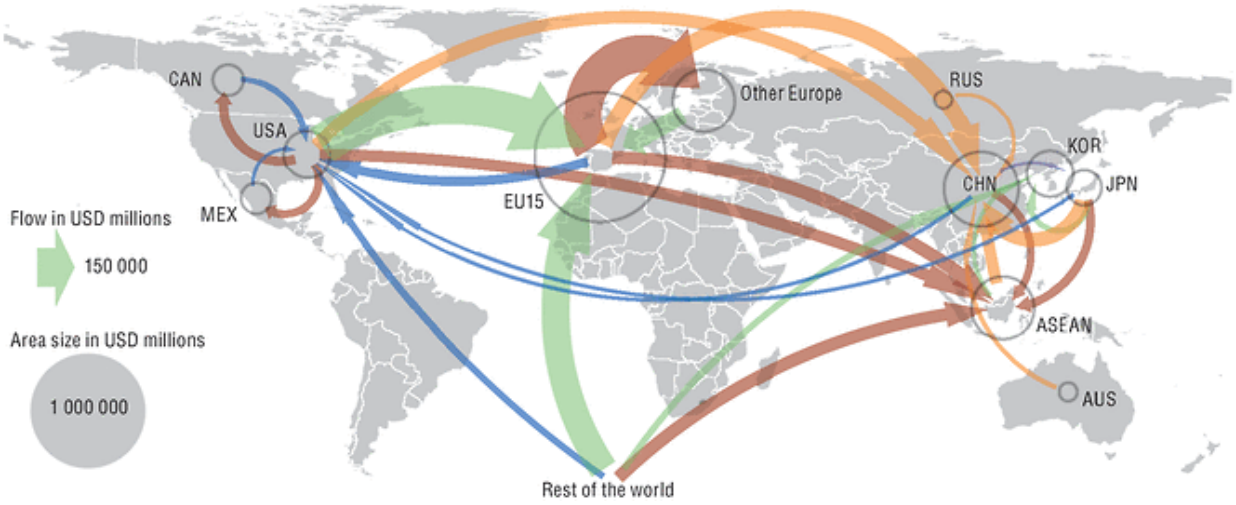


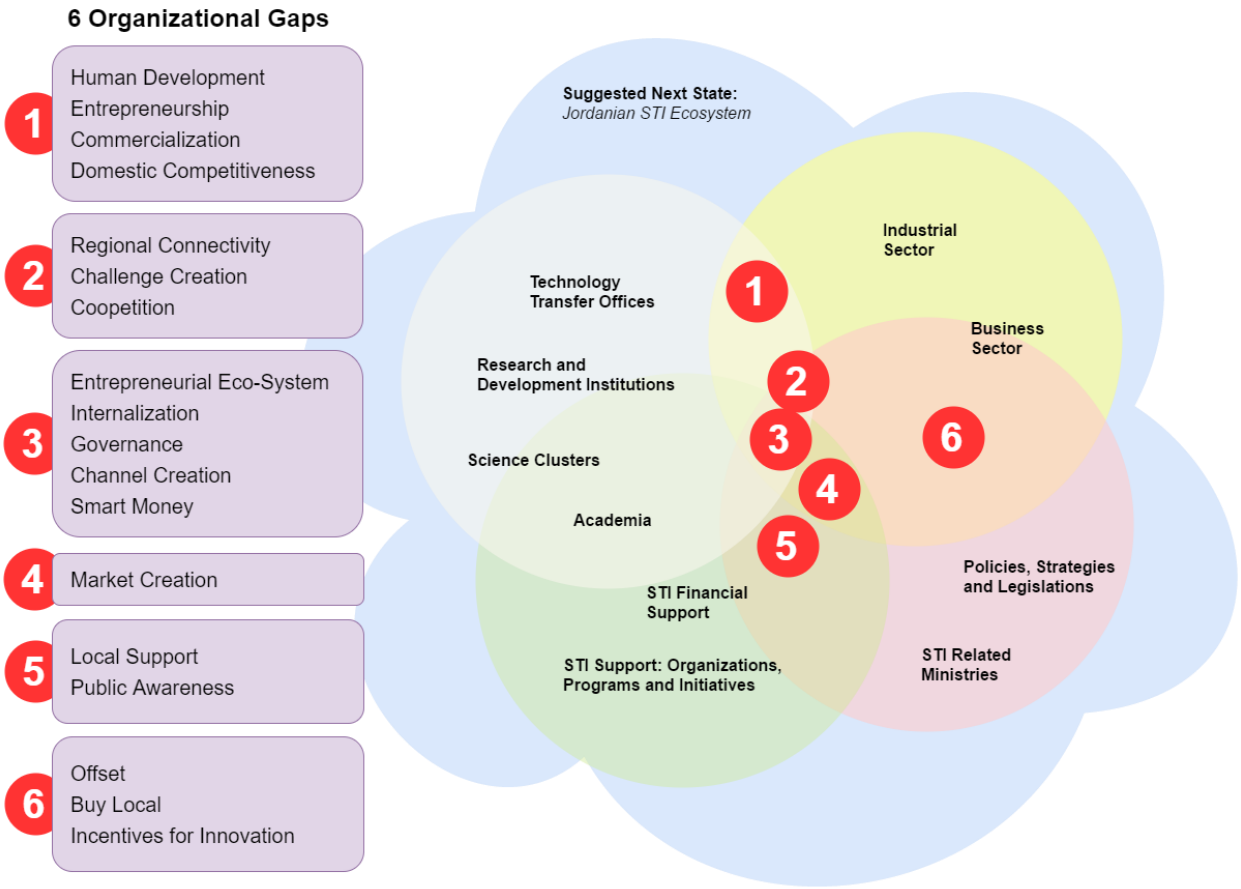
Figure 8. Foreign value added content of exports, 2009 (OECD-World Trade Organization, 2013)



Although, Jordanian STI eco-system has most of the required components, the desired interaction and compounding between them can be depicted in a humble suggestion of a new interaction map of the existing eco-system. The new map suggests incorporation of one of the most crucial components of the eco-system: human resources. In addition, entrepreneurship, competitiveness, coopetition (a fair and constructive combination of cooperation and

competition), governance, market and channel creation, internalization, local enhancements (buy, support, connectivity, challenge creation) and public awareness.

Figure 9. Suggested next state for Jordanian STI eco-system



To better understand the relationship and interaction among the elements of the current eco-system and convey it to a further step, a system of relationships has been offered where solid, tangible and applicable projects and improvements take place. The proposed system was depicted as a diagram and given in Figure 9. The STI Eco-System where the major players have been defined by (UN ESCWA Technology Center, 2015) has been classified into 4 major groups:

- **Science** (in white circular cloud): Technology Transfer Offices, Research and Development Institutions, Science Clusters and Academia.
- **Industry** (in yellow circular cloud): Industrial Sector and Business Sector.
- **Government** (in rose circular cloud): Policies, Strategies and Legislations and STI Related Ministries.
- **Financial Organizations** (in green circular cloud): STI Financial Support and STI Support: Organizations, Programs and Initiatives.

The numbers in red circles enumerate the intersections of these groups which are defined as the organizational gaps where improvements have been proposed for. There are six major gaps determined currently and proposed to be fulfilled in the suggested next state in Figure 9.

The proposition aims to mobilize the potential of brilliant institutions in Jordan as part of STI eco-system and use it in a way to create value out of science, technology and innovation. Value creation should be one of the key aspects of the system. As the nature of the system, significant development and preparation stages in need of time and funds are required. Once the stages of development defined and then applied in a well-planned roadmap, creation of value would occur subsequently.

Another key remark here to make is the local participation. System development such as eco-system development is not a mission for a targeted group. Instead, it is a well understood and coordinated collection of missions that should work in harmony.

As an inception to the proposition, six major soft connections between major elements of STI eco-system were pointed and called as "**Organizational Gaps**" to be filled with interaction through effective project participation.

Organizational Gap 1: An Interaction Between Science and Industry

Human Development

In the hypothesized eco-system, human development has been proposed to bridge between academia and the industry. Not necessarily by means of universities, educational institutions and private life are linked to each other by human resources. Although it is very difficult to change parties, there are many things to do to create significant adjustments according to each other's expectations.

Being one of the most crucial components of the eco-system is human resources development, any change, any alteration or any disturbance in the current system directly targets and utilizes the human factor. It is challenging not only because human development is time consuming and costly, but also hard to sustain because of the mobility of qualified human resources. Qualified workforce needs and searches for better life standards which cause brain drain and sudden loss of a crucial resource.

A vision, mission, duty, expectation or whatever outcome planned is simply the mindset of any individual human resource. Therefore, the alteration should start with the stimulation of the mindset of the individuals. As a rule of thumb in cognitive learning, an individual should be subject to whatever stimulation of interest only in the early adaptation period of the lifetime, namely teenage and even childhood period.

The project proposal should be initiated in the elementary and secondary schools primarily. The proposal development and negotiation skills of the students must be increased. Students should be prepared to a competitive and creative life. Entrepreneurship should be a concept in every step of the education. Not only in the commercial life, but also in social life an entrepreneurial mindset should be awarded to the youth.

- *A coordination team with members from commercialization, technology transfer, entrepreneurship and business acceleration experts with strong connections locally as well as internationally.*

The projects and improvements proposed here should be coordinated by a skillful and authorized team of 8-10 members. The team should include experts from variety of areas who have the passion, self-motivation, risk taking encouragement and team-working skills.

- *Entrepreneurship courses/classes should be incorporated to the curriculums.*

Students should be encouraged to present whatever homework or work they are intended to. Presentation skills can be developed in early stages of learning. The ability of submitting and presenting a work would provide them much better presentation skills after the education life. Undoubtedly, arguments during the presentations will pop in letting the presenter to defend his/her claim or proposal. The argument will lead to a negotiation enforcing them to a better communication. Furthermore, entrepreneurship itself can be added as a standalone class or course providing all the required skill to the students, rather than doing the analysis of financial statements or labor calculations, idea development, problem solving, project development, collaboration, usage of the soft tools for collaboration can be included.

YVI Project in Finland exemplifies the proposition in accordance with Finnish education system, very well. YVI Project (2010-14) aims at developing entrepreneurship education in Finnish teacher training at both vocational (vocational secondary schools) and academic levels (primary schools and teaching of academic subjects at secondary level). The

- *Local and national competitions, hackathons, project development contests should be organized.*

Entrepreneurship counts if only it brings competitiveness. Scientific competitions, project development events gather a great interest of young people not only increasing interaction between students but also providing them getting the skillset for collaborative working and providing the responsibility of being a loyal team member. All these events are actual and lifelike preparations for real life competition. Social acquisitions and achievements are the bonuses.

The hackaton organized and sponsored by Turkish Exporters Assembly (TIM) can be a very representative example. In July, 2016, awarded digital game contest, namely hackathon, the successful projects of young people who developed virtual games within 48 hours of the digital game contest 'Hekaton' were also awarded. Destiny of Leef

- *Applied technology commercialization should start with private sector sponsored thesis submissions*

One of the most effective ways of developing technology is to improve university-industry collaboration. In scientifically improved societies it is mostly observed that companies are in close relationship with universities. The demand is initiated by the industry, so called the real life, where technology is changed into value by means of innovation. Any required R&D can be supplied locally by local academic units. Private sector can define technologically compelling demands and the academic PhD or master theses can be focused according to the demand. The results can be fantastic once desired results are achieved.

A representative and successfully applied example for the proposition is SANTEZ system

- *Project Management Training program should be initiated and a study group for project proposal preparation to international support programs should be assigned.*

The group should both train new project managers/proposal writers and write new proposals in coordination with NCRD and stakeholders. A study and experience sharing group can participate in an EU funded project amongst member or candidate countries. EU project are very well organized, well-structured and include all the very best practices of project management and project cycle management..

Entrepreneurship

As mentioned before, human development has been proposed to bridge between academia and the industry. In spite of the fact that entrepreneurship is directly related to all other factors in the country, as a strategical approach it is proposed to located in here along with the human development.

Experience has shown that entrepreneurship can be learnt. However, the most difficult part is to create an entrepreneurial mindset that is ready and able to take, calculate and mitigate risk. Dealing with risk should be imposed and taught in earlier stages of professional life that officially starts at the academy and even earlier.

- *Success stories should be delivered more effectively in the media. Social media virals and public commentaries must be delivered.*

Twitter, Linkedin are international tools for delivering social impressions by NCRD. https://twitter.com/tubitak can be reviewed for better intuition.

- *Mentoring mechanism/network should be developed. Business sector icons should start incentivizing the network as the pioneers. Create a network of mentors where there are also iconic representatives who are active members.*

A mentor is a person who has solid experience in a specific area and is willing to share his/her experience to transfer the ability of trade off to whoever needs. Mentoring is different from consulting and is a maturity level in business. Mentors, preferably, should be of experienced people. NCRD should prepare a database and a network of potential mentors who can spare time in regular basis for entrepreneurs.

There are many mentors network all over the world. Numerous examples from Turkey

- *Applied public entrepreneurship trainings should be organized. These trainings should be split into two sections: Techno-entrepreneurs and innovative entrepreneurs.*

- *NCRD should prepare a database of entrepreneurs and their areas of interest for further match making activities.*

For better monitoring of the eco-system and for better accessibility to the players of the eco-system, NCRD should have records of the members.

Commercialization

The most crucial part of the technology development process is commercialization. Governmental authorities in most countries provide large amount of R&D funds to researchers and companies. However, they do not make an essential impact analysis. At this very point, the

expectation from the output of the support program is crucial. Unfortunately, and most commonly, academic outputs of the support system are more anticipated by the fund managers. The main reason behind this is that research and science foundations are dominated by academic players where sometimes almost no business or industrial representative exists.

It is undoubted that fundamental science and the eco-system required for developing fundamental, pure science is unavoidable and is a must-to-have attribute. Stepwise developments in the science are expected to come to a maturity point to start creating a spill-over effect. The spill is the technology development and product development respectively. The system which consumed money, human resources, time, energy and hopes so far becomes ready to start generating value. This is when commercialization starts and highly anticipated.

- *R&D support programs must definitely be continued with commercialization. Completed R&D projects should be incentivized for commercialization (production, licensing, etc.).*

- *Intellectual property rights local database must be strengthened.*

IPR are marketable assets for STI eco-systems. They can be changed into products, transferred to third parties or can be licensed. Therefore, a database of IPR should be prepared and people should be encouraged to build IPR related files.

- *Young entrepreneur support programs should be widened so as to cover marketing and export expenses.*

- *Local cooperation and procurement match making network group should be established and should organize quarterly match making meetings with pioneer business leaders, big buyers, industrial organizations and clusters.*

- *Clusters and business representatives should organize monthly meetings and should invite selected entrepreneurs to pitch and demonstrate his/her products.*

As an example, all chambers in Turkey have to organize monthly meetings with sectorial steering committees. In a commercialization and acceleration project which was proposed, entrepreneurs started to be invited to these committees to pitch their products to industrial leaders.

- *Technology transfer offices should work very closely to the business sector. In addition to their current academy to industry licensing and IPR work, they should act as marketers of the developments.*

Domestic Competitiveness

In many developing countries, it is always appealing and encouraging exemplifying success stories in international markets. However, those success stories were able to be created after long period of R&D, SME development, academy-industry collaboration, the number and variety of financial tools that is required and many other factors. Eco-system generated success stories are nice to listen but hard to replicate.

A good start for a competitive international market should be tested locally in the domestic market. This brings two challenges with it. The first challenge is to adapt technological products

according to local market requirements. The local market may not be ready to adjust itself to a technological transformation. Therefore, the risk of investing into a product for local market where there is weak potential may cause failure. The second challenge, products aiming local market may not be plausible for international markets. Therefore, the invested product may require additional investments for adaptation, or sometimes, it can be even useless.

The crucial requirement for value creation for an entrepreneur is to make sales. Sales help raising funds for the company, paying the costs of production, human resources, overheads etc. and also creating customer references. It is not always easy for entrepreneurs to pilot their products or test them in real life situations with real customers. Therefore, customer feedback might be missing. As a matter of the fact that R&D incentives and supports mostly involve scientific or technological developments, the very crucial customer validation step might be mistakenly missing. At this point, local procurement can be a controlled customer validation platform. Any local procurement for the government is a saving for foreign trade imbalance and technological dependence.

- *Governmental procurement especially in technological products should be locally provided. NCRD should start this in house. A proportion of the R&D support program should be dedicated to the competitive local procurement. Although this may not be applicable immediately at this point, it can be a part of a gradual action plan after Jordan starts producing or incentives production of such products. Stimulation of the private sector by announcing that these products will not be imported after certain time*

- *Incentives should be subject to monitoring. After the incentivizing, commercial success should be a part of grading and further incentives.*

- *Academics should be incentivized according to their relationship intensity with industrial sector.*

Organizational Gap 2: An Interaction Between Science, Industry and Government

Regional Connectivity

Policy makers, research and development authorities and private sector representatives are the strong pillars of regional connectivity. Government, academia and private sector should be in very close coordination so that they can improve the system. Policy makers can manipulate the policies accordingly, R&D can define the scientific requirements and the infrastructure of the system and private sector yields the trust and becomes willing to support the local developments. In order to increase the inclusion and participation and also to facilitate the transfer technology, contributions from academics by means of technology creation, innovation, industry collaboration and supportive activities should be subject to promotion and should be awarded.

- *Incentives should be subject to monitoring. After the incentivization, commercial success should be a part of grading and further incentives.*

- *Consortiums should be incentivized more in comparison to individual SME funding.*

- *Public representatives should effectively attend to the business events.*

Challenge Creation

Challenge creation is another way of encouraging people. It is also an application type of incentivizing which creates steps to incentivize people to produce.

Focus to multistage support

- *Project supports should be well split into milestones, sequential processes. Parts of the projects should be well defined and "no go" decisions should be able to made impartially between the parts.*

Targeted product development and R&D

R&D is a two-fold term combining Research and Development. the D part, which faces the commercial and real world side, requires the private sector as the key player. Development, especially when pronounced with product development, requires private sector engagement who does the follow up in favor of customer needs and product continuity. The industrial push and commercial expectations are the driving forces.

- *In accordance with Vision 2025 document, targeted products and outcomes should be a pillar of development. Especially in primary sectors mentioned in the document, NCRD should customize its support programs to make them in compliance with these sectors. However, other developments should keep on as*

Coopetition

The term has been generated by smartly concatenating the words “cooperation” and “competition”. Basically, while there is a winning loser in classical trading, this approach and the players in the market act together to maximize total profits. The example which draws attention with its successful initiatives such as Krombera, Lidian, PeakGames, is enough explanatory: "As an example, Coca Cola and Pepsi's collar is a harmless drink, Competitions in advertising and promotion areas can be given to each other in order to increase their market share. For the development of the eco-system, firms in the same sector need to ignore sectoral benefits that they can compete with when they compete" (Günes, 2013).

- *Cluster members (even direct competitors) should be incentivized to develop complementary products in joint projects*

- *State of products and concurrent development should be exhibited and announced locally as well as internationally.*

Organizational Gap 3: An Interaction Between All Players

Entrepreneurial Eco-System

Although today’s technology and development do not strictly require a specific space, the environment where the idea creation and development are done should be in compliance with strategies and 2025 vision.

- *Create spaces for entrepreneurs. These should be comfortable, close to universities, institutions and city center. This space should be led by well-equipped small teams with relevant experience and soft skills.*

Entrepreneurship require essential business skills and experience. Bright ideas should not be let fail just because of unsatisfactory management and marketing skills.

- *Entrepreneurs should be in close interaction with business and industrial environment. Entrepreneurs should be provided opportunities to pitch their products or business models. Likewise, investors or business people should be provided opportunities to tell youngsters or inexperienced entrepreneurs how they are mistaken or confused as a feedback.*

Demo days are very effective and coherent events that help entrepreneurs market and present their projects/products to potential buyers, investors and other related groups. YFYİ (Yeni Fikirler Yeni Isler) by METU Teknokent in Ankara, Turkey is an exemplary

- *There should be a "projects marketplace" where everyone can present their projects and interact with others. An annual exhibition event should be scheduled for this purpose.*

Internationalization

Vision 2025 is offer fantastic statements for internalization. Under section 2.1 Priority Export Markets, Figure 28: Jordan's Regional Market depicts a devastating market size of 3.8 trillion USD with 380 million potential consumers (Jordanian Government, 2014). The foremost four opportunities were listed in the order of relative importance as follows.

- First, the stable GCC economies.
- Second, the economies of the Palestinian Territories.
- Third, the larger but less stable markets of Iraq, Syria, Egypt and Libya.
- Fourth, the large 'over the horizon' markets or Turkey and Iran.

- *Although the local market is limited due to smaller population, the reach of the country in the region is very powerful. Turkey and Turkey-like Muslim population intense countries should be a good start. Cooperated R&D programs, researcher exchange programs and shared funds for technology should be negotiated with TUBITAK in Turkey. The National Strategy classifies Turkey as the "Over the*

- *Western type technological development requires its own environment, resources, regulations and eco-system. American or European style business development should be very carefully adapted or avoided. Local market needs and regional dynamics should be considered*

Governance

Governance is a crucial part in eco-system management. The decision making and improvement process is way difficult to be made by a unique governing body, instead it is a live, collective and participatory cycle that might have an inception but a completion.

Participation and collective decision making are main pillars of governance and therefore it is suggested in the intersection of all groups that is the center of the eco-system.

- *Instant feedback and information flow availability for the organizations in the eco-system should be provided. Legal governing bodies should announce a board where all the organizations in the STI map have at most two representatives. The channel can filter, categorize, analyze, process or forward the receipts/requests to the related body and proceedings can be announced publicly for public monitoring.*
- *NCRD can create an intranet platform where board can send/receive internal correspondence.*
- *Inactive board members can be dismissed by NCRD.*
- *The board should not have an administrative body or a steering committee. Instead, NCRD should create a channel to receive demands, feedbacks and ideas. Any administrative, secretariat or bureaucratic organ to the board should be avoided as it is experienced that it would create a hierarchy which is a barrier against governance functionality. It also creates unnecessary managerial costs.*

Channel Creation

Marketing is vital in accessing the right market and it is all about creating channels for target potential buyers. Marketing is a very costly process, sometimes the most, that require lots of funds where SME's lack most. At this very important point, the eco-system may help creating channels rather than creating funds for marketing which is more difficult.

- *NCRD should provide referral services to entrepreneurs so that they can increase their reach to larger scale potential customers, providers or buyers. A membership or labeling of entrepreneurs can provide them qualification. Tech City UK, TechAnkara are some examples*

Smart Money

By definition, smart money corresponds to a fund owned, controlled or invested by experienced and knowledgeable people. These type of investors rely highly on data and technical analyses.

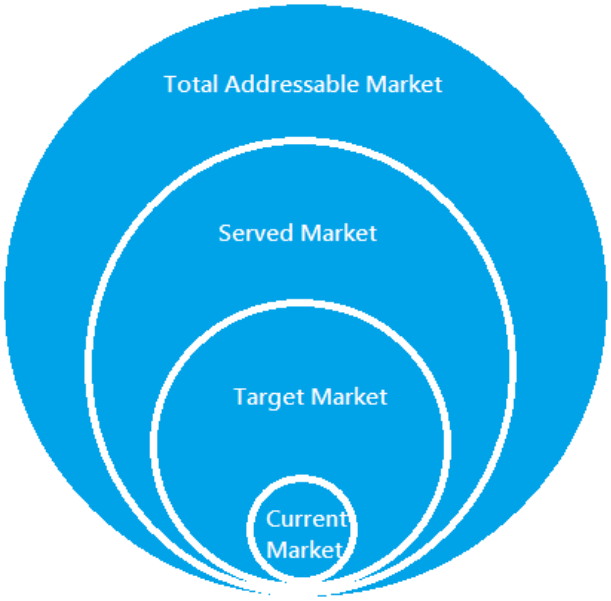
The more they know about the enterprise, the more they feel safe about the investment. However, on the other side, the startup entrepreneur is assumed not to have professional negotiation and diligence skills to valuate his/her idea. NCRD can not only provide valuation for the company or its assets but also valuate potential IPR if there exists one.

- *NCRD should prepare and apply an assessment methodology for entrepreneurs who have idea, innovation, technology or simply a creative business proposal. The assessment should provide sufficient and unbiased information with validations and necessary proofs. The output of the assessment process should be a report that would help a potential investor make an investment decision. Therefore, the report is expected to include business model, revenue model, proof of concept, financials, competition, go-to-market strategy, commercialization strategy, market research and IPR mainly and comprehensively enough.*
- *Such a methodological approach will also provide NCRD important deliverables required for monitoring and impact assessment*

Organizational Gap 4: An Interaction Between Industry, Financial Organizations and Government

Market Creation

Market Creation has a coherent marketing strategy when developing entrepreneurship, innovation, and branding. To help entrepreneurs come up with an attractive customer value proposition, they need to be assisted through market oriented product development, branding and business model innovation. Although market creation from a startup or SME perspective is completely a marketing strategy prepared to penetrate through a new market, the eco-system and its supporting mechanisms can help entrepreneurs accelerate this penetration.



- *Incoming and outgoing trade flow should be co*
  chain should be well understood. It will depict
  needs. Then, product development, branding an
  be supported by means of incentivizing value cr
  accessibility, virtual marketplace, e-trading, out

Total Addressable Market is the maximum available and possible market size for the product offered by an enterprise. It is also called the Total Available Market which is the universe. Served Market is also called the Segmented Addressable Market or Served Available Market is the portion of the total available market that is in the possible reach or target of the enterprise. Target Market is the portion of the Served Market that an enterprise can reach realistically and relatively easily to position itself in the market. Current Market is the current penetrated market or current market share.

This proposal necessarily aims to enlarge Current Market by facilitating the penetration within the Target Market. Some structural improvements in the eco-system can also enlarge the Target Market.

- *Sometimes, regulatory changes can provide rapid market creation. GSM network enhancements, TV frequency band allocations, broader band internet infrastructure development, e-invoicing and e-trade simplifications create new marketplaces for entrepreneurs*

Organizational Gap 5: An Interaction Between Financial Organizations and Government

Local Support

Local support is the awareness and trust of the local players and stakeholders in the eco-system that the system is able to create achievements and especially success stories out of the applied strategies. It helps developing market creation and local brands by means of channel creation. The phenomenon whereby a small change at one place in a complex system can trigger other effect should create more available local funds.

- *A local revolving fund can be established. The fund should be designed such that it can compensate the financial cost. Any beneficiary that utilize the fund should bring it back with either refund or asset sharing with an accountable exit strategy. Any potential beneficiary as an applicant for loan should provide a comprehensive business plan to convince the fund and declare risk assessment strategy.*

Public Awareness

The public must effectively be communicated by either community leaders or by major players of the eco-system. The importance of entrepreneurship should be promoted such that it is a community-based strategy for building common wealth. It can be provided by a healthy communication with the public. Communication is a two-way interaction, therefore input should always be sought when making any decisions that impact the community to ensure public participation.

- *NCRD should create publicity that it is the pioneer of the R&D activities and the primary hub for support for technological development. It should effectively utilize the media: Besides traditional ways such as newspapers, circulars, community newsletters, tv and public radio can be effective, social media such as twitter, facebook and internet portals are far more effective for raising awareness of entrepreneurship challenges and opportunities, as well as for sharing stories of how and what community-entrepreneurial ventures have worked in other communities and regions.*
- *Rather than activity reports that usually few people read, NCRD should*

Organizational Gap 6: An Interaction Between Industry and Government

Offset

Normally, offset agreements are applied for strategic governmental procurements such as defense tools imports, inducting the local participation to the production process to provide technology transfer as well as homeland security.

However, it can also be applied to the civil areas where critical technology is hard to develop internally by internal resources. Foreign companies or internet trades who don't have existence locally as an established local company, can be incentivized to either partner with local companies or start their own local businesses. This is how the local value can be retained locally and the transfer of technology can be facilitated.

- *Foreign providers should be incentivized to partner with local companies to be able to provide goods or services especially to governmental organizations. Terms can be applied.*

Buy Local

A plausible alternative to offset which may not be applicable all of the time is to buy locally. Rather than private buyers, public or public funded buyers can be enforced or incentivized to procure locally.

- *The best example to buy local can be "Buy American Act". The Buy American Act is the statute that creates a national preference for the federal government's procurement of domestic construction materials. Under the Buy American Act, the federal government must purchase domestic construction materials for public use unless a waiver has been granted. In order for a manufactured good to qualify as domestic, it must be manufactured in the US and the cost of the components mined, produced or manufactured in the US must exceed 50 percent of the cost of*

Incentives for Innovation

Incentives are essential to innovation because R&D and related activities are not only costly but also risky. Especially, intellectual property (IP) generating activities suffer from three generic sources of market failure: externalities, indivisibilities and uncertainty (Belleflamme, 2006). The externalities arise from the public-goods nature of information, which makes imitation is easier than invention. Information and knowledge are public good in the sense that they are the consumption by one individual that does not preclude consumption by another individual and an individual cannot be excluded from consuming the good in question. In addition, intellectual property markets are characterized by indivisibility since knowledge and information are inherently discrete. Finally, knowledge creation involves tremendous uncertainty and risk (Lybecker, Kristina, 2014). For all these reasons, we know that innovations must be incentivized.

- *Incentivization that starts in the initial states of the innovation should be continued gradually in the later phases such as product development and production. An innovation is called innovation if only it changes into value. That means a sell act in entrepreneurial language. Therefore, incentives should be provided also in latter stages of the innovation. Supporting R&D only will risk the achievement of targets*

D. Financial Strategy

Major actions and improvements proposed to reach out to the next stage of the Jordanian STI eco-system have been considered deliberately as the least possible funding dependent activities. It is inevitable that certain financial resources should be allocated to the improvement stage.

The common practice and similar experiences offer that development of an STI eco-system by means of solely funding is not effective and efficient as it is thought to be. There are many other factors that take place immediately under sufficiently funded environments.

Although it is very difficult to prioritize the list of requirements for STI eco-system development, it is not necessary to rank the funding neither in the top right position nor at the bottom. Timing of the funding tool highly depends on the stage of an ongoing development process where other environmental conditions have been satisfied.

Once the proposed actions are overviewed, it should be noticed that NCRD has not been directly suggested to offer a funding program. Instead, a positioning scheme has been offered such that it enables NCRD to coordinate stakeholders and offer them joint missions in accordance with their strong attributes. Therefore, a financial strategy statement should be considered for finding ways of funding the proposed actions rather than a granting scheme for NCRD.

The pillars of the proposed 40 improvements for each foreseen gaps in the eco-system are composed of 2 main cost items.

- Qualified human resources to program, plan and execute the projects.
- Overhead costs for event management and organization.

A team of professionals has been proposed in the Final Word section to run this improvement campaign and one of the main duties that the team should be assigned is to raise funding or finding ways of raising funds. Available resources such as World Bank, UNDP, Islamic

Development Bank, TIKA of Turkey, EU framework programs, Newton Fund of UK, BOOST program of the Department of State of the United States (supports indirectly over local applicants) are just samples of interest. The sustainability should not be an issue in long term. Therefore, the system should be self-sustaining.

On the other hand, a significant amount of co-funding is always crucial in order to provide local loyalty to the process. Generally co-funding or local share of expenses is declared as 25% of the total expenditure. The capacity building period of NCRD can be 24 to 36 months. There supposed to be 5 main budgeting items and approximately 4,8 Million USD should be spared for this capacity building. The tentative allocation of budget items has been given in Table 10. Tentative budget allocationTable 10.

Table 10. Tentative budget allocation

	2018	2019	2020
Human Resources	720.000	760.000	800.000
Capacity building	600.000	100.000	150.000
Public Relations	150.000	150.000	150.000
Business Development		300.000	300.000
Commercialization Support		300.000	300.000
TOTAL	1.470.000	1.610.000	1.700.000

This capacity building and the repositioning should be taken as a project and its operation identification sheet must be prepared. Subsequently, terms of reference (ToR) document should be well prepared before any budgeting action has been taken.

E. Final Word

R&D value chain flow starts from research (whether basic or applied) to technology transfer or development to commercialized product or service. Jordan needs an R&D eco-system with functional architecture for a proper flow.

The roadmap discussed hereby outlines the different elements of the current R&D eco-system in Jordan. It identifies deficits in interactions among these elements that belittled its effective output and hindered its ability to deliver tangible achievements. It shows that the current system does not support synchronization or alignment of activities and their strategies need to have more shared vision.

The roadmap also suggests initiatives to rectify these deficits to produce functional system in which each and all stakeholders are able to clearly understand their role and what decision need to be made.

Success of R&D and thrive of innovation culture is dependent on the role and influence of key players in the eco-system. These are;

- **Academia and research centers in public and private organizations or institutions.** Their capabilities and capacities have been referred as manifested in the availability of skilled researchers and research infrastructure. Another equally important aspect is the availability of favorable habitat as reflected in their vision, governance and ethos.
- **The state including the government and the society.** Their awareness is vital in accepting the challenge and cost of R&D and its implication in overall economic development and prosperity. Their role spans to cover allocation of funds, making investments, extending incentives, providing legal framework to protect IP rights and introducing entrepreneurial education as early as possible in the curriculum.
- **The industry with ever fast-pacing technology and market demand.** Industries should sharpen their competitive edge by participating in or accommodating the output of R&D.

Although Jordan has some strength in a number of R&D areas, including some medical areas, IT, engineering and agriculture, most of the efforts dissipated in bits and pieces of published work without significant impact on innovation in the country. As a matter of fact, it is safe to conclude that R&D system in Jordan is underperforming its potential. This necessitates that the key players in the system need to revisit their strategies and introduce what it takes to achieve coherence and alignment with a collective mission of national R&D strategy informed by roadmap such as the one that is being discussed. For this to succeed, roadmaps have to be invested and drafted for each component of the system.

For instance, the academia and research institutions component is marred with problems that stem out from governance, lack of interactions within and between its subcomponents, inadequate capability and capacities and very often lack of strategy for R&D.

That is one reason among many why Jordan is perceived as unable to attain vector and make thrust in innovation and product development. Other important reason is the longtime absence of institutional platform or entity provide leadership that can align R&D efforts nationwide. Thus, the establishment of NCRD is overdue and it comes in response to this problem.

NCRD is expected to lead and orchestrate national R&D efforts if it is powered with proper mandate and equipped with strategy coupled with realistic action plan.

The envisaged role of NCRD could fall in the following tasks:

- **NCRD should view R&D from strategic perspective:** To do this, it should be empowered to initiate, encourage and help in developing or revisiting current strategies, if present, in all individual components of the R&D eco-system.
- **Setting national priorities for R&D:** This will maximize the benefits from available resources and will convey positive environment for R&D alignment by providing steering mechanism for R&D programs. However, setting priorities should be informed by considering the need and justification for development and the reality of research strength.

- **Identification of opportunities:** NCRD should be able to exploit possibilities of existing resources and to access marketability of the R&D product before passing a judgement on proposals. NCRD through its board and advisory committee should be able to suggest or/and screen submitted proposals and make decisions on what and who participate in R&D programs.
- **Facilitate commercialization of R&D products and help in IP legal procedures.**
- **Networking:** NCRD provide a platform for interactions at local, regional and international levels. This will help in maintaining and improving national expertise and facilitate access and exposure to international R&D program and labs.

As mentioned earlier, NCRD can provide institutional framework to encourage or suggest formation of national R&D consortia that cut across all national institutions. Thus, it can pull research into mainstream to accelerate technology transfer or development.

A careful and insightful outlook to the Jordanian STI showed that it has all the necessary organs or entities to fulfill the requirements of having a proper STI eco-system. The ECSWA Map is a clear proof that an establishment action has been taken and structural development is on the go.

The SWOT on the other hand, indicates the regional and cultural effects on the STI eco-system. The region should seek a way to mitigate any weaknesses or threats and should change it to opportunities. It is strongly believed that inner interactions and creative collisions of the Jordanian STI eco-system should be increased effectively and immediately. The observed gaps and missing interactions have been sketched and the major 6 gaps have been proposed to have solid tangible improvements which should be well tailored in practice to fit perfectly to Jordan STI eco-system.

As a matter of fact, this change can be costly and painful, therefore a transition period should be provided to get to the suggested next state of the Jordan STI eco-system. The transition should be smooth and should be with strong public agreement as well as with the participation of all parties. It should be well noted and agreed on that the current structure of the eco-system does

not need to be changed. What is to be triggered rather than changed is to alter and improve the way it functions. The change will be occurring rather in the state of mind than the state of the current eco-system.

The system should immediately switch to collaborative and collective tasking under shared targets which can be best achieved by naming every single member of the eco-system a Jordanian STI eco-system member. Thereafter, any contribution provided to the system or any duty to be accomplished or any service provided should be named as Jordanian STI eco-system service. This is an effective way of putting institutional differentiation aside that may naturally create singularity. Rather, individual institutions should keep their identities in the role that they take over for contribution within their collective agenda.

Although creation of new entities to re-organize or coordinate complex eco-systems might possibly create additional complexities, one individual entity, probably NCRD should take over the coordination and facilitation task in a way that it is run independently. Gathering a strong team within the Innovation Center or in NCRD with a group of 10 to 12 people at most is required in order to perform, monitor and update the proposed improvements, namely institutional gaps in the previous section.

The team should include skillful, well-educated, internationally connected, open-minded, flexible, relatively young, passionate professionals with relevant soft skills, who are willing to spend time, effort and also willing to encourage and influence others. The team should also be capable of project preparation, proposing, execution, management, monitoring, reporting and impact assessment.

The team should be a collection of talents from variety of interdisciplinary areas with a team leader (director) coming from commercialization background. The team is suggested to include an IP expert, technology transfer expert, university-industry collaboration expert, business development expert, commercialization expert, negotiations expert, policy making and legal expert, a sociologist, foreign trade expert, event designer/expert, community builder, and a

financial expert in addition to the team leader. An illustration of the foreseen team is given in the Appendix.

The proposed team should carefully understand the whole STI community in Jordan, its dynamics and be well introduced to all the stakeholders. The team should be in assistance of the stakeholders and should act as a smart arm to them, but definitely not as a financial arm. All of the team members should realize and understand the determined organizational gaps and should be able to adjust them according to the local needs. Furthermore, the group should change these gaps into solid project proposals of their own. The management style of this team should be pretty much like the private sector; e.g. market driven, stakeholder focused and result oriented.

A “terms and principles” document should be prepared for the team and their mission should be very well defined and communicated. Stakeholders should be introduced and agreed upon these principles. They should declare their cooperation as well as objections if any. The team is intended to be local but act as international in the sense that they envision the accomplished next state of the Jordanian STI eco-system. They need to have targets and milestones individually as well as the group as a whole to fulfill in the course of a scheduled plan. These may include the number of entrepreneurs they have prepared an assessment document for, the number of inward investment they attracted, the amount of commercialization locally and internationally, the amount of revenue generated out of activities provided by their initiatives and similar indicators. All these have to be accomplished with and for and through the existing stakeholders of the STI eco-system in Jordan.

The new team of NCRD itself can be a project proposal to World Bank, to TIKA of Turkey or to other possible international sources of related funds and be proposed as the major part of an improvement act in the system. It would be good to co-fund the group locally in order to increase local support and local participation. The team members should also be good contacts of heads of eco-system member organizations and should be able to access them easily.

The team will need soft tools such as stakeholder relationship management software which will enable them record and keep track of any activity and monitor ongoing projects. The system should also allow stakeholders monitor the project group's activities with a dashboard. Demo events are crucial to retain public interest and awareness. Regular events should be organized by the team to attract local and international potential buyers, investors, media and promoters. Demo events are usually a budget way of reaching out to focus groups of interest for entrepreneurs and also an effective way of creating new channels.

Finally, there is plenty of potential for the STI eco-system in Jordan to use its existing structure in a more effective way and bring more value to its markets and to its people. The eco-system does not require new entities or structures. Like any other country, Jordan cannot afford to spent its limited resources to duplication of roles, responsibilities and work.

Fulfillment of this task successfully would also help Jordan in meeting its promise to the 2030 Agenda for Sustainable Development Goals (SDG) as agreed in Resolution adopted by the UN General Assembly on 25 September 2015.

This report is proposing very strongly to reposition NCRD, not as a research and/or financial center, but definitely as the passionate coordinator, facilitator and connector of the STI eco-system in Jordan.

Appendix

1. The Proposed Team

Figure 10. Proposed team

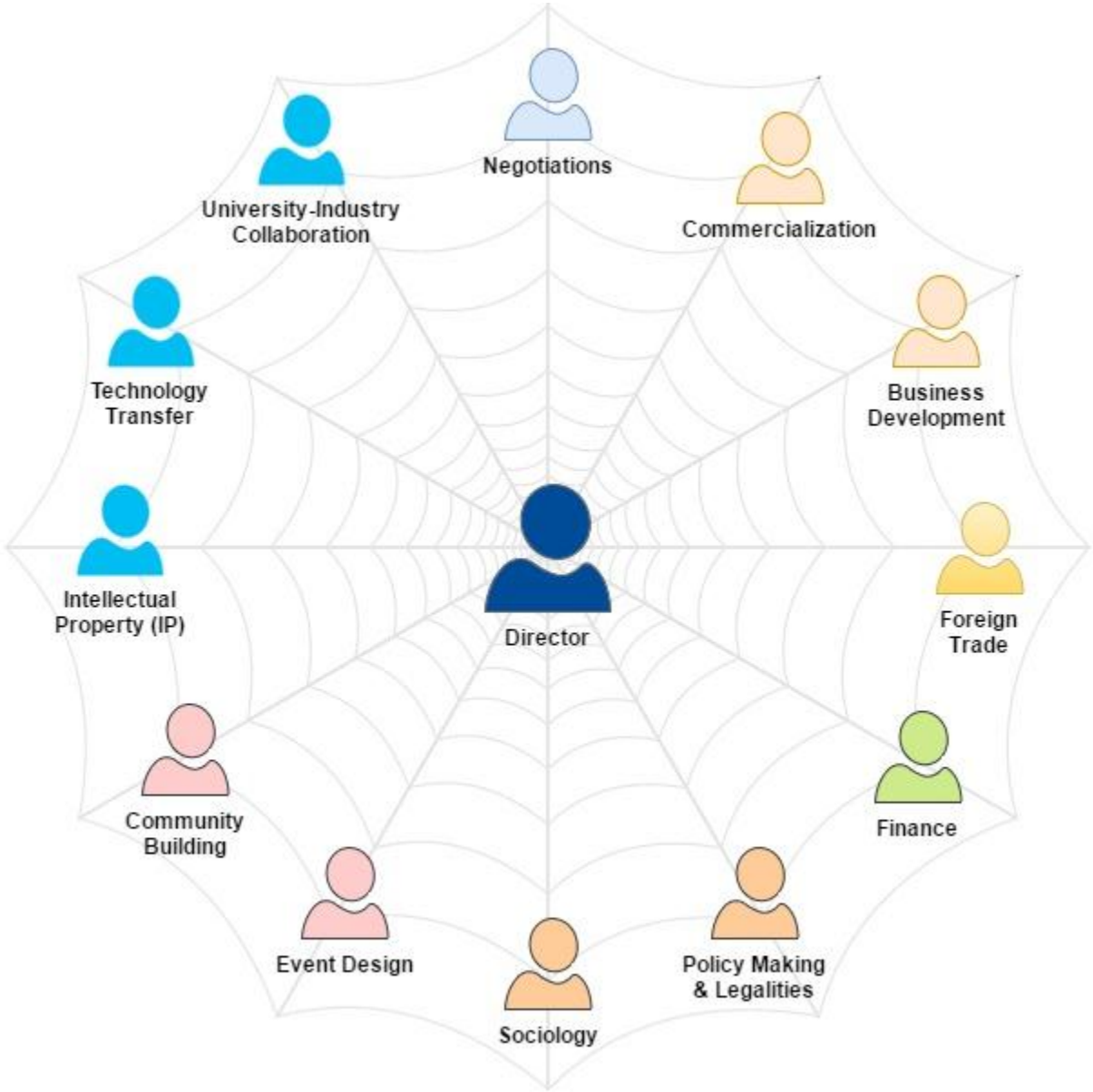
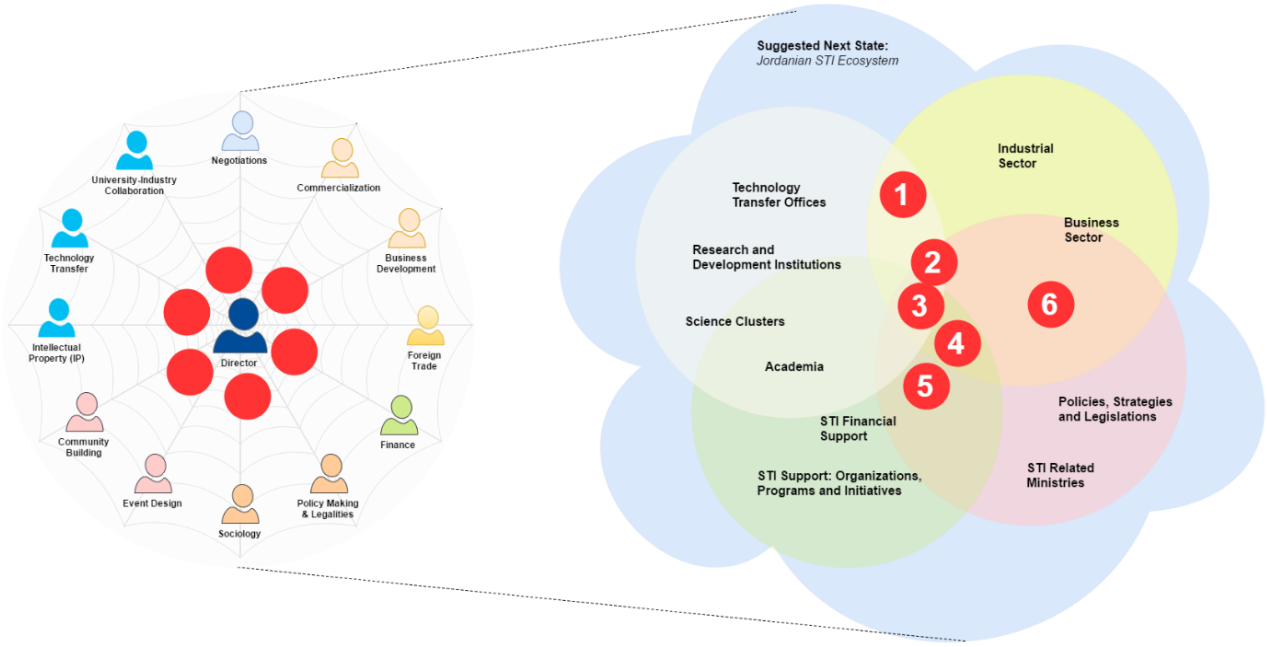


Figure 11. The proposed team and Jordanian STI eco-system



2. The 2030 Agenda for Sustainable Development: Goals and Targets

UN General Assembly, Resolution adopted by the General Assembly on 25 September 2015, Transforming our world: the 2030 Agenda for Sustainable Development, 17 Sustainable Development Goals and 169 Targets.

Goal 1. End poverty in all its forms everywhere

1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day

1.2 By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions

1.3 Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable

1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance

1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters

1.a Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for

developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions

1.b Create sound policy frameworks at the national, regional and international levels, based on pro-poor and gender-sensitive development strategies, to support accelerated investment in poverty eradication actions

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round

2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons

2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment

2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain eco-systems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality

2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed

2.a Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries

2.b Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round

2.c Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility

Goal 3. Ensure healthy lives and promote well-being for all at all ages

3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births

3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births

3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases

3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and wellbeing

3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol

3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents

3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes

3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all

3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination

3.a Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate

3.b Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all

3.c Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States

3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes

4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education

4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university

4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship

4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations

4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy

4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development

4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all

4.b By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries

4.c By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States

Goal 5. Achieve gender equality and empower all women and girls

5.1 End all forms of discrimination against all women and girls everywhere

5.2 Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation

5.3 Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation

5.4 Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate

5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life

5.6 Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences

5.a Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws

5.b Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women

5.c Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels

Goal 6. Ensure availability and sustainable management of water and sanitation for all

6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all

6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

6.6 By 2020, protect and restore water-related eco-systems, including mountains, forests, wetlands, rivers, aquifers and lakes

6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies

6.b Support and strengthen the participation of local communities in improving water and sanitation management

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

7.1 By 2030, ensure universal access to affordable, reliable and modern energy services

7.2 By 2030, increase substantially the share of renewable energy in the global energy mix

7.3 By 2030, double the global rate of improvement in energy efficiency

7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology

7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

8.1 Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries

8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors

8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services

8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead

8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value

8.6 By 2020, substantially reduce the proportion of youth not in employment, education or training

8.7 Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms

8.8 Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment

8.9 By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products

8.10 Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all

8.a Increase Aid for Trade support for developing countries, in particular least developed countries, including through the Enhanced Integrated Framework for Trade-related Technical Assistance to Least Developed Countries

8.b By 2020, develop and operationalize a global strategy for youth employment and implement the Global Jobs Pact of the International Labour Organization

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries

9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets

9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending

9.a Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States

9.b Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities

9.c Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020

Goal 10. Reduce inequality within and among countries

10.1 By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average

10.2 By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status

10.3 Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard

10.4 Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality

10.5 Improve the regulation and monitoring of global financial markets and institutions and strengthen the implementation of such regulations

10.6 Ensure enhanced representation and voice for developing countries in decision-making in global international economic and financial institutions in order to deliver more effective, credible, accountable and legitimate institutions

10.7 Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies

10.a Implement the principle of special and differential treatment for developing countries, in particular least developed countries, in accordance with World Trade Organization agreements

10.b Encourage official development assistance and financial flows, including foreign direct investment, to States where the need is greatest, in particular least developed countries, African countries, small island developing States and landlocked developing countries, in accordance with their national plans and programmes

10.c By 2030, reduce to less than 3 per cent the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5 per cent

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums

11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries

11.4 Strengthen efforts to protect and safeguard the world’s cultural and natural heritage

11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations

11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities

11.a Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning

11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels

11.c Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials

Goal 12. Ensure sustainable consumption and production patterns

12.1 Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries

12.2 By 2030, achieve the sustainable management and efficient use of natural resources

12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses

12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment

12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle

12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities

12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production

12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products

12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities

Goal 13. Take urgent action to combat climate change and its impacts*

(Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.)*

13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

13.2 Integrate climate change measures into national policies, strategies and planning

13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

13.a Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible

13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution

14.2 By 2020, sustainably manage and protect marine and coastal eco-systems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels

14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics

14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information

14.6 By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation *(Taking into account ongoing World Trade Organization negotiations, the Doha Development Agenda and the Hong Kong ministerial mandate)*

14.7 By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism

14.a Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries

14.b Provide access for small-scale artisanal fishers to marine resources and markets

14.c Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of “The future we want”

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements

15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world

15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development

15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species

15.6 Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed

15.7 Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products

15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species

15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts

15.a Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems

15.b Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation

15.c Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities

Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

16.1 Significantly reduce all forms of violence and related death rates everywhere

16.2 End abuse, exploitation, trafficking and all forms of violence against and torture of children

16.3 Promote the rule of law at the national and international levels and ensure equal access to justice for all

16.4 By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime

16.5 Substantially reduce corruption and bribery in all their forms

16.6 Develop effective, accountable and transparent institutions at all levels

16.7 Ensure responsive, inclusive, participatory and representative decisionmaking at all levels

16.8 Broaden and strengthen the participation of developing countries in the institutions of global governance

16.9 By 2030, provide legal identity for all, including birth registration

16.10 Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements

16.a Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime

16.b Promote and enforce non-discriminatory laws and policies for sustainable development

Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Finance

17.1 Strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection

17.2 Developed countries to implement fully their official development assistance commitments, including the commitment by many developed countries to achieve the target of 0.7 per cent of gross national income for official development assistance (ODA/GNI) to developing countries and 0.15 to 0.20 per cent of ODA/GNI to least developed countries; ODA providers are encouraged to consider setting a target to provide at least 0.20 per cent of ODA/GNI to least developed countries

17.3 Mobilize additional financial resources for developing countries from multiple sources

17.4 Assist developing countries in attaining long-term debt sustainability through coordinated policies aimed at fostering debt financing, debt relief and debt restructuring, as appropriate, and address the external debt of highly indebted poor countries to reduce debt distress

17.5 Adopt and implement investment promotion regimes for least developed countries

Technology

17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism

17.7 Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed

17.8 Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology

Capacity-building

17.9 Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the Sustainable Development Goals, including through North-South, South-South and triangular cooperation

Trade

17.10 Promote a universal, rules-based, open, non-discriminatory and equitable multilateral trading system under the World Trade Organization, including through the conclusion of negotiations under its Doha Development Agenda

17.11 Significantly increase the exports of developing countries, in particular with a view to doubling the least developed countries' share of global exports by 2020

17.12 Realize timely implementation of duty-free and quota-free market access on a lasting basis for all least developed countries, consistent with World Trade Organization decisions, including by ensuring that preferential rules of origin applicable to imports from least developed countries are transparent and simple, and contribute to facilitating market access

Systemic issues

Policy and institutional coherence

17.13 Enhance global macroeconomic stability, including through policy coordination and policy coherence

17.14 Enhance policy coherence for sustainable development

17.15 Respect each country's policy space and leadership to establish and implement policies for poverty eradication and sustainable development Multi-stakeholder partnerships

17.16 Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries

17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships

Data, monitoring and accountability

17.18 By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts

17.19 By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries

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