



Specific Support to Tunisia Background report

Horizon 2020 Policy Support Facility



Specific Support to Tunisia - Background report

European Commission
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Manuscript completed in September 2018.

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Luxembourg: Publications Office of the European Union, 2017

Print	ISBN 978-92-79-93114-7	doi:10.2777/10448	KI-AX-18-012-EN-C
PDF	ISBN 978-92-79-93113-0	doi:10.2777/068176	KI-1X-18-012-EN-N

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Specific Support to Tunisia
Background report

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LIST OF ABBREVIATIONS

Abbreviation	Description
ANPR	National Agency for the Promotion of Scientific Research
APIA	Agency for Agricultural Investment Promotion (Agence de promotion des Investissements Agricole)
APII	Agency for the promotion of industry and innovation
BERD	Business expenditure on R&D
EC	European Commission
EIS	European Innovation Scoreboard
EU	European Union
FDI	Foreign Direct Investment
FPR	Federated research projects
FTE	Full-time equivalent
GDP	Gross Domestic Product
GEM	The Global Entrepreneurship Monitor
GERD	Gross domestic expenditure on research and development
HE	Higher education
HEI	Higher education institution
ICT	Information and communication technologies
IMF	International Monetary Fund
INNORPI	National Institute of Standardization and Industrial Property – Institut National de la Normalisation et de la Propriété Industrielle
IT	Information technologies
MESR	Ministry of Higher Education and Scientific Research
MoI	Ministry of Industry
PASRI	Project for the Support of the Research and Innovation System / Projet d'Appui au Système de Recherche et de l'Innovation
PhD	Doctor of Philosophy
R&I	Research and innovation
R&D	Research and development
SME	Small and medium-sized enterprise
TTO	Technology transfer office

UGTT	Tunisian General Labour Union - Union générale tunisienne du travail
UTAP	Tunisian Union of Agriculture and Fisheries- Union tunisienne de l'agriculture et de la pêche
UTICA	Tunisian Union of Industry, Commerce and Crafts - Union Tunisienne de l'Industrie, du Commerce et de l'Artisanat
VRR	Transfer of research results programme
WB	World Bank

1 INTRODUCTION

This background report for the H2020 Specific Support to Tunisia focuses on describing the key characteristics of the research and innovation (R&I) system in Tunisia, its key actors and governance structure and policies.

The report is structured as follows:

- In Chapter 2 we set the R&I system within its political, social and economic context and provide some key information on the public and private funding of R&D and the country's performance in both innovation and scientific research
- Chapter 3 provides an overview of the research performers in Tunisia and their key characteristics and functions
- We describe the Research and Innovation governance system in Chapter 4, including an overview of the research policies and priorities, and a description of the key challenges emerging
- The final Chapter 5 is dedicated to the public R&I funding system, both in terms of the institutional and competitive funding of research and R&D financing in the private sector

2 THE CONTEXT

2.1 Political and social context

Tunisia was the cradle of the Arab Spring, starting in December 2010. The so-called Arab Spring was triggered by demonstrations in Tunisia in December 2010. Popular unrest quickly spread across the region, revealing a common aspiration towards freedom, dignity and justice (ESCWA, 2014a).

The years following Tunisia's revolution in 2011 were marked by **strong political instability** (cf. Appendix 1) and **security problems**. Following ratification of a new constitution in January 2014, an interim government ruled until Tunisia's first full parliamentary and presidential elections in 2015. A national unity government - a coalition of the main political parties and civil society groups¹ - was formed in September 2016 to tackle the urgent economic reforms but has undergone its first cabinet reshuffle in February 2017.

The first-ever OECD Economic Survey of Tunisia in 2018 highlights the significant strides that have been made since the return to democratic rule, including increased participation in political processes, new freedoms of expression and association, a reduction in poverty rates and solid participation in global value chains. According to the 2018 OECD Economic Survey, Tunisia experienced improvements in living standards across all regions. Overall, the poverty rate has dropped and access to basic infrastructure and public services has improved.

However, the Survey also mentions the substantial challenges posed by weak job creation, high unemployment and unsustainable public finances. As most Arab countries, Tunisia so far has failed to create economic opportunities on a sufficient scale to absorb the growing pool of youth. Social tensions and regional development inequality remain one of the main risks in the country, as the Western and Southern regions still suffer of high poverty.

The government is facing the challenge of balancing between social stability and the need for fiscal consolidation, notably in the civil service, pensions, subsidies, state-owned enterprise, and competition reforms. (World Bank, 2017).²

Table 1 Socio-economic indicators for the Maghreb countries, 2017

	Tunisia	Algeria	Morocco
Population, total ('000s)	11,532	41,318	35,739
GDP per capita (constant 2010 US\$)	4,304	4,825	3,292
GDP per capita, PPP (constant 2011 international \$)	10,849	13,914	7,485
GDP growth (annual %)	1.96	1.70	4.10
Unemployment, total (% of total labor force) (national estimate)*	15.51	10.20	9.29

¹ Coalition of political parties and civil society groups: 1/Nidaa Tounes, founded by Béji Caïd Essebsi, 2/ Ennahdha, the Islamic party headed by Afek Tounes, 3/ A group advocating for economic liberalism and 4/ the Free Patriotic Union (UPL) founded by Slim Riahi.

² World Bank Tunisia Outlook 2017

Unemployment with advanced education (% of total labour force with advanced education)**	42	n.a.	n.a.
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Notes: *Data for 2016; ** Data for 2013 - Source: World Bank's World Development Indicators, July 2018

The 2015 UNESCO Science Report³ considers that throughout the region, there still is a long way to go to improve governance. Government effectiveness has deteriorated in several Arab countries and according to Kaufmann et al. (2011; 2013), the “voice and accountability” indicator has been disappointing in the past ten years.

The United Nations E-Government Survey published in 2016 ranks Tunisia 72th in terms of global development of e-administration and 43th in terms of e-participation (i.e. efforts to evolve towards participatory decision-making, through the use of open data, online consultations and multiple ICT-related channels) (United Nations Department of Economic and Social Affairs, 2016). Morocco, Tunisia and Mauritius are the only three countries in the African group in the Top 50 in terms of e-participation.

The Global Information Technology Report 2016 published by the World Economic Forum assigns to Tunisia a Networked Readiness Index (NRI)⁴ value of 3.9 and a rank of 81 out of 139 countries. Tunisia was in the 35th position in 2007. By way of comparison, Morocco reached a similar NRI value in 2016 (3.9) and was positioned 78th; Algeria reached an NRI value of 3.2 and was ranked 117th.

High unemployment rates and a widespread ‘informal’ employment

In 2016, 15.6% of the economically active population and around 35% of the youth (15 to 24 years) was unemployed, which is higher than in the majority of OECD countries and emerging countries. (OECD, 2018).

Unemployment is high especially among graduates of higher education where the unemployment rate exceeds the average rate (31% in 2017) and among women (over 22% in 2017). Reasons explaining the difficulties for the young to access the employment market include:

- The age structure of the population with a total median age of 31.6 years (Central Intelligence Agency, 2017)⁵ creating increased demand for educational services and a high number of graduates in comparison with job opportunities on the market.
- Existing mismatch between the skills taught in local educational institutions and the needs of the labour market, both technical and soft skills
- Social and gender divides often intensify this labour mismatch

³ UNESCO Science Report: towards 2030, 2015

⁴ The Networked Readiness Index measures how well an economy is using ICT to boost competitiveness and well-being. Networked readiness depends on whether a country possesses the drivers necessary for digital technologies to meet their potential, and on whether these technologies are actually having an impact on the economy and society. The drivers are grouped within three sub-indexes: the overall environment, readiness (which includes infrastructure, affordability and skills) and usage (which is made up of individuals, business and government).

⁵ World Fact Book Tunisia 2017

The 2018 OECD Economic Survey also indicates a widespread informal employment and precarious working conditions. Depending on sources and definition, the 'informal' job market is estimated at representing between 30% and 45% of total employment (World Bank, 2014; CRES, 2016). Although this rate is lower than the average for the countries of Latin America and Asia, it is nonetheless higher than for countries of the OECD or countries in transition.

Unemployment rates are also much higher in the hinterland compared to coastal regions. While unemployment rates among young graduates reach 31% on average in the country, it reaches 58% in the governorate of Tataouine, in the South.

Regional inequalities

The economic choice to favour the export sector (the so-called 'offshore regime' – see the next section below) has led to a concentration of activities in the coastal areas, leaving the inland regions behind. According to the 2018 OECD Economic Survey, these inland regions generally depend on a narrow range of basic products and are little integrated into global value chains. About 92% of industrial companies are less than an hour away from the three largest cities (Tunis, Sousse, Sfax). These three regions provide 85% of the country's gross domestic product (GDP). (Vindt, 2018)⁶

2.2 The economic context

2.2.1 Economic policy – a historic overview

In the 1960s, Tunisia opted for an economic model oriented toward exports and industrialisation, supported by a proactive policy of public investment in physical and human capital, and of attracting FDI through a law favouring enterprises that export their entire production. A **dual-economy model** was set up, segmenting the economy in export-oriented (offshore) and domestic-oriented (onshore) sectors.

Companies in the 'offshore sector' (the free trade zones in Bizerte and Zarzis, known as Parcs d'Activités Economiques) are exempt from customs duties on imports and exports, pay a reduced tax rate, enjoy simplified administrative procedures, and benefit from unrestricted foreign exchange transactions. The production in these zones has a limited duty-free entry into Tunisia for the purpose of transformation and re-export.

According to the World Bank⁷, the model successfully accompanied the structural transformation of the Tunisian economy in the 1970s and 1980s. It played a positive role as the offshore sector was relatively open to foreign investors and earned much-needed foreign exchange, while the heavily protected onshore sector facilitated the development of a local industrial base.

⁶ Alternatives économiques, Tunisie : des inégalités régionales explosives. Gérard Vindt 01/01/2018 HORS-SÉRIE N°113

⁷ World Bank. 2014. The unfinished revolution: bringing opportunity, good jobs and greater wealth to all Tunisians (English). Washington, DC: World Bank Group.

In the pre-revolution period, economic sectors highly integrated in the global market were able to attract investment, converge to European Union's labour productivity standards, and boost job creation. These trends helped Tunisia's sustain an average 5 percent growth over 20 years. It placed Tunisia among the best performers in the region and in emerging countries. It also resulted in the location of the majority of exporting enterprises near logistical export zones (ports and airports), though, which as mentioned above, led to strong regional disparities.

Tunisia progressively strengthened its relationship with the European Union (EU) starting with an association agreement signed in 1995 that led to a free exchange zone for industrial products, which took effect in 2008. The EU is Tunisia's main industrial partner and main client. Tunisia also adopted a Small Business Act in 2008, promoting SME growth and their access to public markets. (Africanmanager.com, 2008)

Shortly after the signature of the association agreement with the EU, Tunisia carried out a national programme for upgrading industry, a better integration into global value chains (GVCs) and enhanced competitiveness. The programme aimed at enhancing the organisational, technological, and marketing capabilities of firms being gradually exposed to competition vis-à-vis the European Union. Much effort was deployed also to facilitate global integration through trade facilitation measures. Electronic documentation processing was introduced (Tunisia Trade Net), but also streamlined technical controls, improved customs procedures, and increased access to information on standards and technical regulations to raise transparency and meet international trade obligations. (World Bank, 2009).

The post-revolution difficulties slowed down Tunisia's integration in the world economy; the country's strong dependency on Europe also led to economic difficulties during the financial crisis. In addition, the transfer of productive resources from low technology and knowledge-based economic sectors to economic sectors with a higher content of technology and knowledge in the country remained insufficient.

The 2014 World Bank report strongly set these economic difficulties in the context of the dual-economy model, which it considered to constitute a **major obstacle to growth**, no matter how useful it had been in the past. The report argued for a structural transformation of the economy by removing "distortions and barriers to market access that undermine productivity growth and ultimately jobs creation". It questioned the usefulness of the high investment in tax incentives to the offshore sector, which amounts to approximately two percent of Gross Domestic Product (GDP), and emphasised that the offshore firms mainly limit themselves to low value-added activities and assembly, contributing little to the absorption of the highly-skilled work force in the country. It also highlighted the negative effects on the onshore sectors in terms of barriers to entry and to competitiveness and to the creation of "the space needed for the country to incubate homegrown industries as countries like South Korea have done."

The 2015 UNESCO Science Report, however, considered that the economy had proven relatively resilient over the past four years, thanks partly to its broad base, with well-developed agricultural, mining, petroleum and manufacturing sectors. This helped to cushion the drop in the tourism sector, which accounted

for 18% of GDP in 2009 but only 14% four years later. Tourism was beginning to recover when terrorist acts against a museum and hotel complex in 2015 once more destabilised the industry. Tunisia’s relative stability and reputed health clinics have also made it a beacon for medical tourism.

2.2.2 Macro-economic context

Despite notable progress in democratisation and ongoing reform efforts, Tunisia’s transformation to a more market-oriented economy has been gradual. This has affected the country’s main socio-economic indicators: GDP growth has been slow, unemployment rates and public debt have risen, inflation rates increased, and the Dinar fell around 10% compared to the Euro in 2016.

A slow economic growth

Tunisia’s economic activity has grown slowly in the post-revolutionary period with an increase of 2.333% in real terms in 2017, a figure close to the pre-revolution percentage but far from the 2007 growth pick of 6,25% (IMF, October 2017). Economic growth reached 2.0% in T4 2017 (Tunisian National Institute for Statistics, 2017) thanks to the recovery in the strategic sectors of agriculture, phosphate and manufacturing.

In the medium term, economic growth is projected to pick up gradually to 3.03% in 2018 and 3.2% in 2019 against a backdrop of improved business climate thanks to structural reforms and greater security and social stability (Table 2). The fiscal deficit is expected to remain high at 5.9% of GDP in 2017. Fiscal sustainability will require reining in the public wage bill, expanding the tax base, and creating space for increased investment spending. (World Bank, April 2017).

Table 2 Tunisia - Macro poverty outlook indicators (annual percent change unless indicated otherwise)

	2015	2016	2017	2018 f	2019 f	2020 f
Real GDP growth, at constant market prices	1.1	1.0	2.0	2.7	3.3	3.7
Private Consumption	1.6	1.6	1.5	0.6	1.4	4.6
Government Consumption	4.8	3.8	-2.4	-8.3	2.3	-6.1
Gross Fixed Capital Investment	-2.5	2.8	4.4	4.4	4.9	6.2
Exports, Goods and Services	-2.8	0.2	4.2	4.7	4.5	3.6
Imports, Goods and Services	-2.5	2.0	2.2	-1.1	2.3	2.6
Real GDP growth, at constant factor prices	1.0	0.8	1.7	2.7	3.3	3.7
Agriculture	12.3	-8.5	2.5	5.0	1.9	3.0
Industry	-1.5	-0.5	-0.9	3.9	4.6	4.6
Services	0.6	2.9	2.7	1.9	3.0	3.4
Inflation (Consumer Price Index)	4.9	3.7	5.3	6.7	5.6	4.6
Current Account Balance (% of GDP)	-8.9	-8.8	-10.2	-9.5	-7.8	-7.2
Fiscal Balance (% of GDP)*	-5.6	-6.0	-6.3	-5.6	-3.7	-2.7
Debt (% of GDP)	54.8	61.2	72.9	77.8	77.2	76.2
Primary Balance (% of GDP)	-3.7	-3.8	-4.0	-2.9	-1.1	-0.7

Notes: e = estimate, f = forecast. (a) Fiscal balance excludes grants; Source: World Bank, Poverty & Equity and Macroeconomics, Trade & Investment Global Practices.

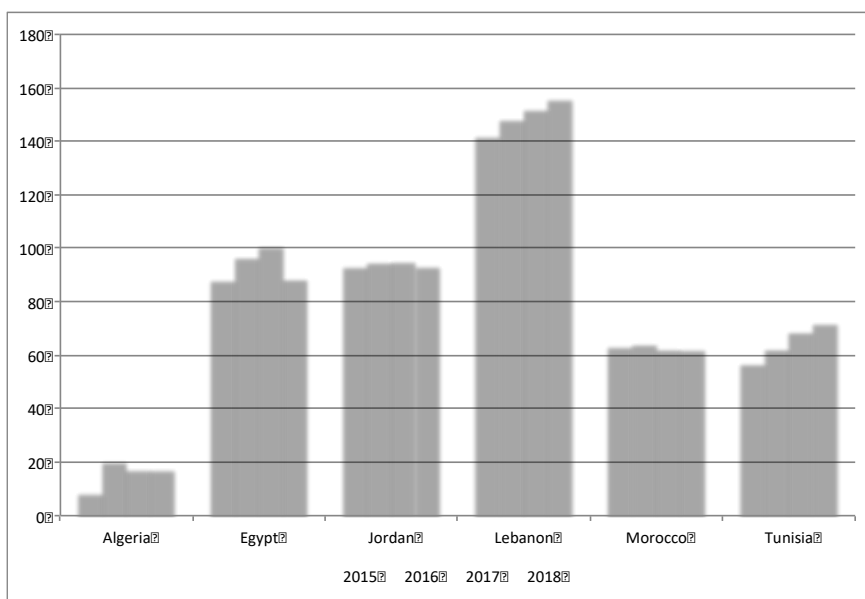
Inflation rates fell slightly in 2016 (3.7%) but increased in 2017 (4.4%) and inflation is expected to rise in 2018 seeing the increase in imported goods and energy prices following the depreciation of the Dinar which fell around 10% compared to the euro in 2016. The Central Bank has increased its policy interest rate in two instances since April 2017 to 5 percent from 4.5 percent (World Bank, October 2017).

Tunisia also faces large external deficits, even though the current account deficit is projected to slightly scale down to 8.35 percent of GDP in 2018. According to the World Bank, in the medium term the current account is likely to benefit from the gradual recovery of industry and services trade, and competitiveness gains from the depreciation of the Dinar (World Bank, 2016).

Public debt has risen to 62.9 percent of GDP in 2016, up from 57.2 percent in 2015 and from 45.5 percent in 2012 (World Bank, 2016). It is foreseen to reach 72.2 percent of GDP in 2018. Indeed, the country had to invest considerable resources in anti-terrorist operations whilst oil production fell, and its public sector remained large. Other countries in the region also deal with an important public debt (Figure 1, below).

In this difficult situation, the government is seeking a stable economic strategy. Since 2017 it has adopted austerity policies advised mainly by the IMF. These policies should help control the public deficit. They involve a reduction of the number of civil servants, an improvement in tax collection mechanisms and an increase of corporate tax (Societe Generale, 2018).

Figure 1 General government gross debt in regional countries, percentage of GDP



Source: World Economic Outlook Database, October 2017

Foreign direct investment (FDI)

Over the last few decades, Tunisia has chosen to further liberalise its economy and to integrate it in the world economy. A new competition law, adopted by the Government in 2015, cancelled previous provisions that fixed prices, limited the entry of companies into certain sectors and controlled production, distribution, investment, etc.

In 2016, Tunisia adopted a new investment law that simplifies the procedures to obtain investment licenses, permits and authorisations (Journal Officiel de la

République Tunisienne , Octobre 2016). The law created the High Investment Board as a central body to replace the multitude of administrative bodies that previously issued these required documents. The law also made hiring of foreign workers easier, adding an element of flexibility to what are otherwise the most rigid labour market regulations in the MENA region (Santander, 2018).

There was a decline in FDI in Tunisia in the early 2010s due to the global recession, the country's socio-political revolution and the crisis in the Eurozone, followed by the deterioration of the country's security situation and the lack of medium and long-term economic visibility in 2013-14 (Table 3, below). The Tunisian Investment Agency, however, indicates that FDI started to recover in 2016, marking a 4.6% increase.

The main FDI investment sectors are energy (47%) and electronics (16%); the pharmaceutical industry, agri-food industry, tourism and telecommunications account for between 5% and 6% of FDI each. From a cost perspective, British Gas and OMV were the top 2 companies investing between 2013 and 2015; in terms of jobs created, however, Yazaki Group and Benetton were on top (Financial Times).⁸

In 2014, 26% of the exported goods were electrical and electronic equipment, 15.6% were articles of apparel, and 12.3% mineral fuels and oils (International Trade Center).

Table 3 Foreign direct investment inflows, 2010-15 (USD million)

	2010	2011	2012	2013	2014	2015
Algeria	2,301	2,580	1,499	1,693	1,507	-587
Morocco	1,574	2,568	2,728	3,298	3,561	3,162
Tunisia	1,513	1,148	1,603	1,117	1,063	1,002

Sources: OECD African Economic Outlook, based on: UNCTAD, FDI Online Database, January 2017; World Investment Report 2016.

2.2.3 Meso/Sectoral perspective

In 2016, the Tunisian 'dual economy' entailed a modern industrial base composed of 5,600 businesses with more than ten employees and a spread of under-capitalised small enterprises, most of them with a single person, and 80% concentrated in the services sector, particularly in commerce, transport and storage (Trape, 2018).⁹

In terms of number of companies, Tunisia has a close-to-equal share of enterprises active in the agro-food and electrical, engineering and electronics industries (IME) sectors (18.5% and 17.6%, respectively) (AfDB/OECD/UNDP, 2014). The key industry sector is textile and clothing, encompassing 32% of the private enterprises. The chemical industry accounts for 9.7%, construction materials 8%. In 2015 around 45% of industrial companies were wholly exporting enterprises and the source for 60% of industrial jobs (Pillot, May 2015).

Sectoral value added and GDP growth

⁸ Source: FDI intelligence from The Financial Times

⁹ Source: African economic outlook Tunisia

Tunisia’s integration policies have led to a rise of textiles and clothing industries and more recently, to the growth of the electrical, engineering and electronics sectors, including the development of automotive and aeronautics components (AfDB/OECD/UNDP, 2014).

The local economy is largely oriented towards the **service sector**, which accounts for over 63.5% of the GDP (2017 estimate) and employs nearly half of the country's workforce (58.9% in 2016) (Central Intelligence Agency, 2017). It includes the booming sectors of ICT and tourism. Since the early 2000s, the development of information and communication technologies have allowed new service activities to emerge such as call centres or outsourced accounting services. Tunisia occupies a position of regional leadership in the ICT sector (2nd in Africa). The tourism industry, however, has suffered from the deteriorating security situation.

Agriculture is a key sector of the Tunisian economy. In the past years the production of the agriculture sector has improved enabling the country to reach a level of food security (except for 2016 due to severe drought). The sector is well positioned in organic farming and cultivation of olive trees, fruit trees and palm trees. In 2017, Agriculture accounted for over 10% of the GDP and employed over 12% of the workforce (Central Intelligence Agency, 2017).

Industry (manufacturing and non-manufacturing) represented 25.9% of the GDP and employs one-third of the workforce in 2017 (Central Intelligence Agency, 2017). The sector’s production includes petroleum, mining (particularly phosphate, iron ore), tourism, textiles, footwear, agribusiness, beverages. The textile industry has been relatively hit by Asian competition. The country's industrial sectors are predominantly export-oriented.

Table 4 GDP by sector - % of GDP at current prices

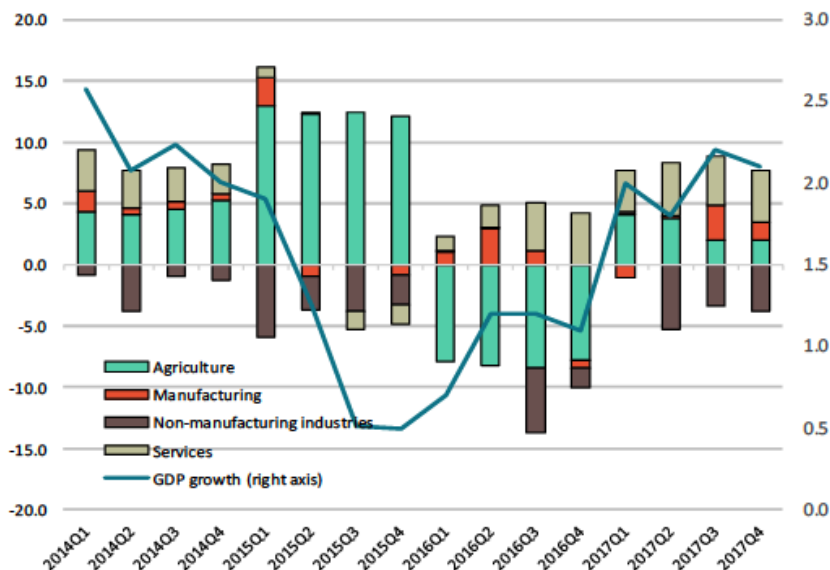
Sector	2011	2016
Agriculture, forestry, fishing and hunting	9.0	11.1
Industry		
Mining and quarrying	7.8	5.2
of which oil	7.3	4.5
Manufacturing	17.5	16.9
Electricity, gas and water	1.4	1.5
Construction	4.8	4.6
Services		
Wholesale and retail trade; Repair of vehicles; Household goods; Restaurants and hotels	13.5	14.2
of which hotels and restaurants	4.3	4.1
Transport, storage and communication	13.0	11.8
Finance, real estate and business services	15.1	15.3
Public administration and defence	7.6	5.7
Other services	10.4	13.7
Gross domestic product at basic prices / factor cost	100	100

Source: OECD African Economic Outlook - Data from domestic authorities

The recent increase in economic growth is mainly driven by the service and agricultural sectors (for the latter, an exception was the year 2016 because of

exceptional drought) (Figure 2, below). Manufacturing has had a smaller yet positive contribution, while non-manufacturing industries have contracted.

Figure 2 Sectoral value added and GDP growth, Tunisia 2013-2017



Source: World Bank, Tunisia's economic outlook, October 2017, based on Institut national de statistiques, Banque centrale de Tunisie and staff computation.

Exporting activities

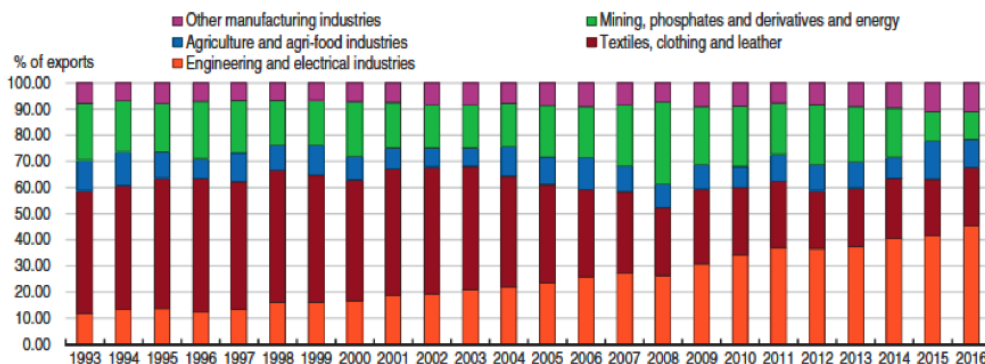
The 2018 OECD Economic Survey informs that Tunisia's trade intensity, measured by the share of exports and imports in GDP, approached the OECD average in 2016, and was higher than that for many emerging countries. About 80 percent of export is to Tunisia's main economic partner, the European Union, mainly France and Italy.

According to the OECD, Tunisia has the highest number of exported products with revealed comparative advantage among countries of the Maghreb. The share of manufactured goods in total exports rose to 76%, well above the level observed in Egypt, Morocco and the majority of other countries in the region, and the product structure of exports has become more diversified. Recent data show the increasing importance of the engineering and electrical industries' exporting activities (Figure 3).

The 2018 OECD report highlights that Tunisian exports have also moved up the complexity scale, outstripping all the countries of Africa but South Africa. In 2016 Tunisia ranked 52nd worldwide on the scale of complexity, which reflects the sophistication, diversity and specificity of exports according to the Atlas of Economic Complexity.

The report indicates that exports of products from the pharmaceutical, plastics and engineering and electrical industries have performed particularly well, "reflecting long-standing investments in the education sector, especially in science and engineering".

Figure 3 Distribution of exports by sector of activity



Source: OECD ECONOMIC SURVEYS: TUNISIA © OECD 2018, based on National Statistics Institute; World Bank, World Development Indicators (WDI); UN Comtrade database; OECD Trade in Value Added (TIVA) Database; and OECD calculations

According to the 2018 OECD Economic Survey, the companies in the 'offshore sector' accounted in 2016 for 78% of merchandise exports excluding energy, a share that has been rising sharply. These offshore companies also account for 34% of formal salaried employment in the private sector.

The report points out, however, that due to its status, the offshore sector has little interrelationship with the rest of the economy. Firms can import their inputs without customs duties, provided their total production is re-exported

The off-shore sectors acquired the right to conduct up to 30% of their sales within the national territory (only) in 2017. However, the OECD report considers that cumbersome administrative and customs procedures limit the spill-over effect of exports onto enterprises in the onshore sector.

Outlooks

Similar to the 2014 World Bank report, the 2018 OECD report highlights that **more than 60% of the exports of 'onshore' firms regards low-technology products** such as agricultural, energy, mining and phosphate products.

The country has many opportunities that lie ahead. Prospective analyses (Pillot, May 2015) identified the following 10-year development sectors:

- Technical textiles
- The development of elaborated agro-food ranges (semi-preserved, frozen, packaging), nutrition, bio, well-being and cosmetics
- Automotive and aerospace industries that include embedded electronics, plastics advanced techniques and materials, mechatronics, robotics
- The development of ICT and Business Process Outsourcing by the infrastructure and the companies of services
- Health and biotechnologies where Tunisia has some comparative advantages: numerous international collaborations, proximity to Europe, climate and logistics.

The 2018 OECD Economic Survey considered that even though Tunisia has a relatively well-developed system for supporting **business creation**, providing information, training, financing and monitoring services during the first two years of activity, efficiency gains remain possible. The OECD report noted that while microbusinesses and self-employment play a big role in job creation, just 2% of young people aged between 18 and 24 were involved in setting up a company in 2012 (Belkacem and Mansouri, 2013); compared to their peers in OECD countries, young Tunisians are also less likely to state that they have access to training and financing. The OECD saw a need for better medium- and long-term assistance to young entrepreneurs, especially women.

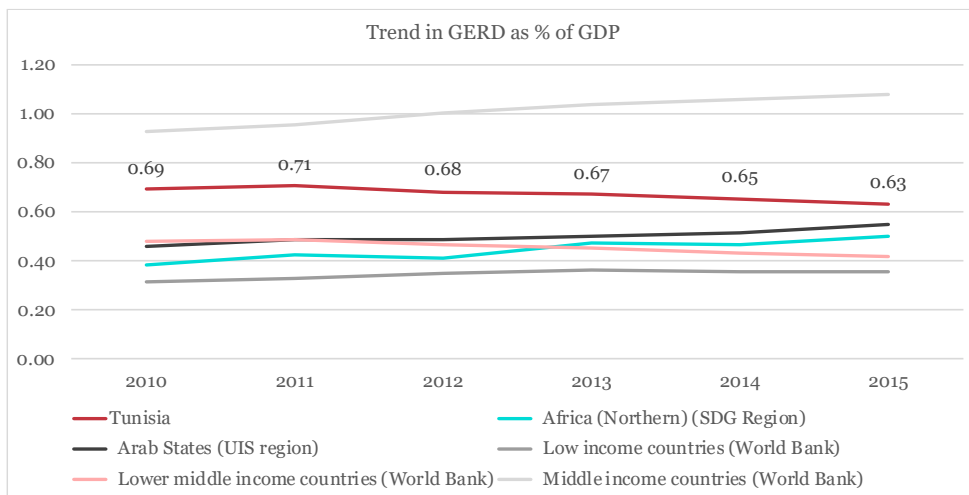
2.3 Overview of the Research and Innovation environment

2.3.1 Investment in R&D

GERD as a percentage of GDP

Tunisia has a relatively low R&D intensity: its gross domestic expenditure on R&D (GERD) accounted for 0.63% of GDP in 2015. one can note a continuing downward trend since 2011, bringing the current share of GDP invested in R&D down to the levels of 2003 (Figure 4).

Figure 4 Gross domestic expenditure on R&D (GERD) as a percentage of GDP



Source: UNESCO Institute for Statistics, Latest available data February 2018

Nevertheless, Tunisia still has a higher level of R&D intensity than the average values for Northern Africa and the Arab States (which however both show upward trends) and the countries categorised by the World Bank as 'lower middle income' economies. The 2015 UNESCO Science Report points out that a GERD/GDP ratio

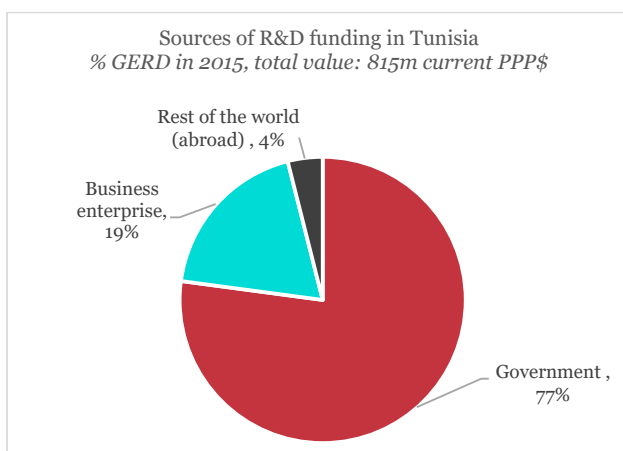
of around 0.7% is close to the average for upper middle-income economies (UNESCO, 2015).¹⁰

Sources of R&D funding

The low level of R&D intensity - mainly due to insufficient private investment in R&D - is one of the long-standing challenges of Tunisia's R&I system.

Government is the main source of R&D funding in Tunisia, accounting for about 80% of GERD in 2015 (Figure 5). The business enterprise sector accounted for (only) about 20% and funding from abroad for 4%. While the share of GERD financed by industry is higher than the levels observed in other lower middle-income economies, it is below the levels observed in 2016 in other countries in the region such as Morocco (29.9%) and Qatar (24.2%) (WIPO, 2016).

Figure 5 GERD by source of fund



Source: UNESCO Institute for Statistics (UIS), Latest available data April 2018

Data from the UNESCO Institute for Statistics (UIS) show a rather stable structure of the R&D funding over the last decade, overall. However, there was a **slow but steady upward trend in R&D investment by business enterprises** in the last decade (18.8% of GERD in 2016 compared to 17.1% in 2010). In current PPP\$, the business enterprise sector invested 154.5m in R&D 2015, compared to 128.4m in 2010. GERD funded from abroad, instead, has been steadily decreasing, dropping from 4.8% of GERD in 2010 to 4% in 2015.

2.3.2 Innovation performance

Despite the positive trends mentioned above, in terms of competitiveness Tunisia's position globally has worsened in the last 6 years. It has been affected by geopolitical conflicts and local turbulences but also confronted with the rise of many emerging countries, including the small Gulf countries and Eastern European countries. As a consequence of these developments, the 2017-2018

¹⁰ UNESCO Science Report: Towards 2030, 2015

Global Competitiveness Report¹¹ published by the World Economic Forum (WEF) places Tunisia in the 95th position (out of 137 countries), while Tunisia was ranked 36/144 in the 2007-2008 Global Competitiveness report. In 2017, Tunisia scored 3.93 points out of 7 on the Global Competitiveness Index (GCI), a record low since 2007 (the average score in 2007-2018 was 4.29) (World Economic Forum).

The WEF 2017-18 GC report classifies Tunisia among the “Stage 2: Efficiency-driven economies”. In these economies, growth is based on the development of more efficient production processes and increased product quality. Compared to the other countries in the region, Tunisia has a lower performance on the 11th and 12th pillars of the GCI, i.e. innovation capacity (capacity for and commitment to technological innovation) and business sophistication (efficiency and sophistication of business processes) (Figure 6).

Positive trends are to be noted for the indicators related to ‘Financial market development’ and especially, ‘Technological readiness’.

¹¹ The most recent 2017-2018 edition of Global Competitiveness Report assesses 137 economies. The report is made up of over 110 variables, of which two thirds come from the Executive Opinion Survey representing the sample of business leaders, and one third comes from publicly available sources such as the United Nations. The variables are organized into twelve pillars. The GCI score varies between 1 and 7 scale, a higher average score means a higher degree of competitiveness

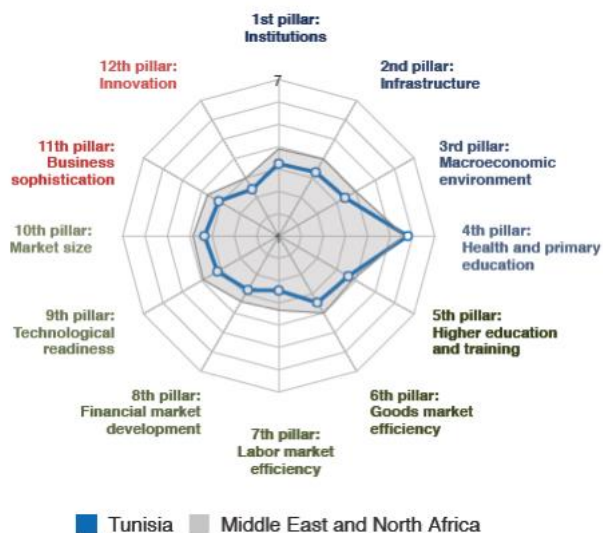
Figure 6 Global competitiveness index - Tunisia's performance, 2017-2018

Index Component	Rank/137	Score (1-7)	Trend	Distance from best
Global Competitiveness Index	95	3.9		
Subindex A: Basic requirements	84	4.4		
1st pillar: Institutions	80	3.8		
2nd pillar: Infrastructure	82	3.8		
3rd pillar: Macroeconomic environment	109	3.9		
4th pillar: Health and primary education	58	6.0		
Subindex B: Efficiency enhancers	99	3.7		
5th pillar: Higher education and training	82	4.1		
6th pillar: Goods market efficiency	112	4.0		
7th pillar: Labor market efficiency	135	3.1		
8th pillar: Financial market development	110	3.4		
9th pillar: Technological readiness	85	3.7		
10th pillar: Market size	69	3.9		
Subindex C: Innovation and sophistication factors	97	3.4		
11th pillar: Business sophistication	98	3.7		
12th pillar: Innovation	99	3.1		

Source: Global Competitiveness Report 2017-2018 edition

Reflecting the areas of particular strength and weakness depicted in Figure 6, above, when set within the context of the Middle East and North African region, Tunisia scores particularly well for the indicators in the pillar "Health and primary education", while a lower-than-average performance is to be noted for the pillar 'Labour market efficiency' (Figure 7).

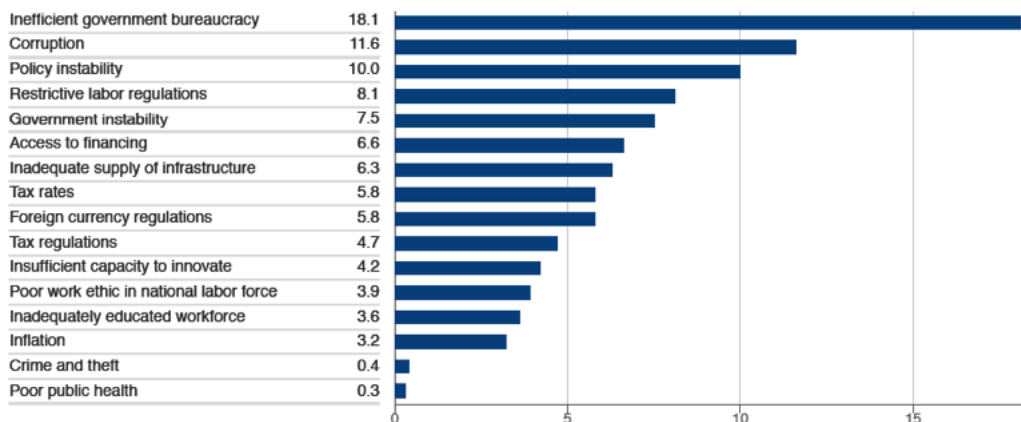
Figure 7 Global competitiveness index - Tunisia's performance in the regional context



Source: Global Competitiveness Report 2017-2018 edition

The main obstacles to the development of trade are also analysed along 16 proposed criteria: in Tunisia, the 9 most important obstacles to international development include the **inefficiency of public administrations, difficulties in accessing finance and political instability**. These obstacles are reflected also in the outcomes of the 2016 Executive Opinion Survey, organised by the WEF: inefficient government bureaucracy, policy instability, and corruption are indicated as the most problematic factors for doing business in Tunisia (Figure 8).

Figure 8 Most problematic factors for doing business



Note: From the list of factors, respondents to the World Economic Forum's Executive Opinion Survey were asked to select the five most problematic factors for doing business in their country and to rank them between 1 (most problematic) and 5. The score corresponds to the responses weighted according to their rankings. Source: World Economic Forum, Executive Opinion Survey 2016

2.3.3 Performance in scientific research

Tunisia currently is one of the leading scientific players in North Africa and the Middle East, alongside Iran, Israel, and Egypt. A bibliometric study part of the PASRI project and published in 2015 highlighted that Tunisia was amongst the first African and Arabic countries in terms of the number of scientific publications.

Since the mid-1990s, the public research sector has significantly increased its scientific output, as measured by the number of scientific papers published in peer-reviewed journals. Tunisia also increased the visibility of its scientific production internationally and the quality of peer-reviewed journals targeted by its publications has improved. Data of publications indexed in Scopus show a rise in number of publications especially since 2013: in 2016, 5,739 publications were indexed, compared to 4,192 in 2012.¹² Despite these positive trends, the scientific visibility of Tunisia's published articles is still well below the world average (HASSAN, 2015).

The 2015 bibliometric study highlighted that Tunisia's strengths lie in certain areas of applied science that overlap with its industrial strengths, in particular: agriculture, fisheries, forestry, ICT, biology, mathematics and statistical sciences and a number of specialities in engineering sciences, biomedical research and clinical medicine. These key areas of specialisation are reflected also in Tunisia's participations in the European Union Framework Programme 7, which were focused especially on the areas of Agrifood and environment, health, and ICT.

Co-publications and collaboration in research

Collaboration among researchers play a key role in enhancing the quality of scientific publications. Co-authorship networks also reveal the existing links between researchers at the local, national or international levels.

The PASRI bibliometrics report found that Tunisian universities and research centres tend to co-publish more internationally than at the national level. Both universities and research centres co-publish internationally close to half of their publications while only one fourth are national co-publications. Nevertheless, international cooperation activities were still low compared to other countries in the region (43% against 49% for Algeria and Morocco).

The sample of 67,416 scientific publications authored or co-authored by Tunisian researchers over the period 1990-2016 drawn from Scopus indicates that co-authors of Tunisian researchers mainly come from France: more than 28% of Tunisia's scientific publications are co-authored with French researchers, illustrating the strong links between Tunisian and French researchers.¹³

National collaboration is especially among and between universities and research centres active in the same scientific disciplines; interdisciplinary collaboration leading to scientific publications is rare.

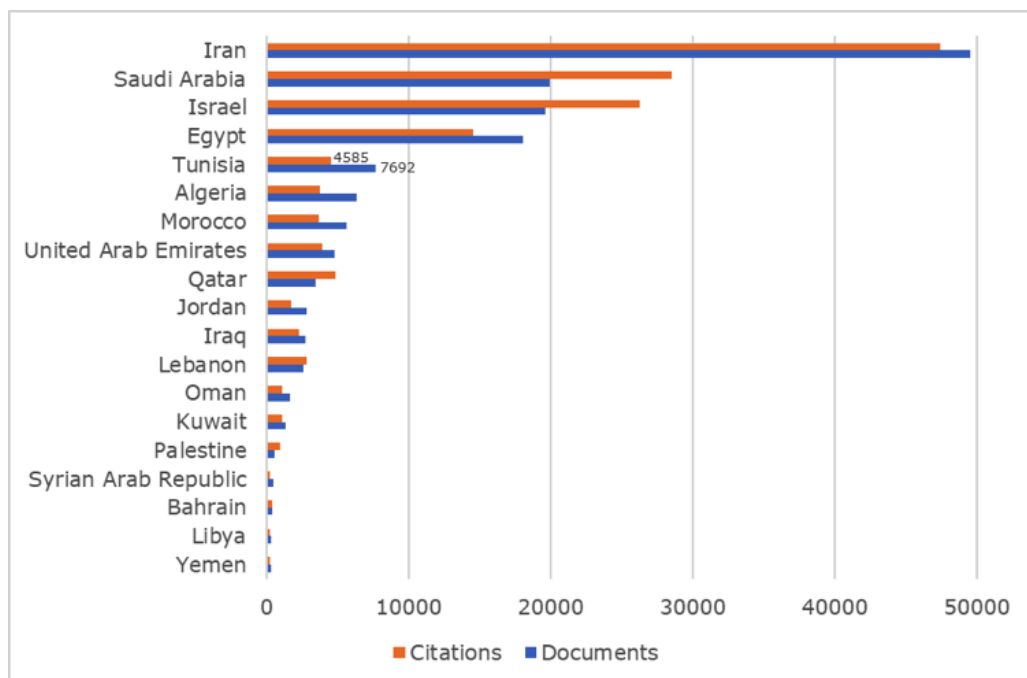
¹² MESR, Scientific Research: Priorities, future directions, and key initiatives 2017-2022

¹³ Source: Scopus. Data analysed by Technopolis, 2018

Scientific impact

The quality of Tunisia’s scientific publications can be assessed through the number of citations received by publications as well as the H Index.¹⁴ An H Index of “x” means that the country (i.e. researchers from the country) has published at least “x” papers that have each received at least “x” citations. Figure 9 illustrates the leading position of Tunisia in North Africa and the Middle East.

Figure 9 Number of documents and citations in 2016



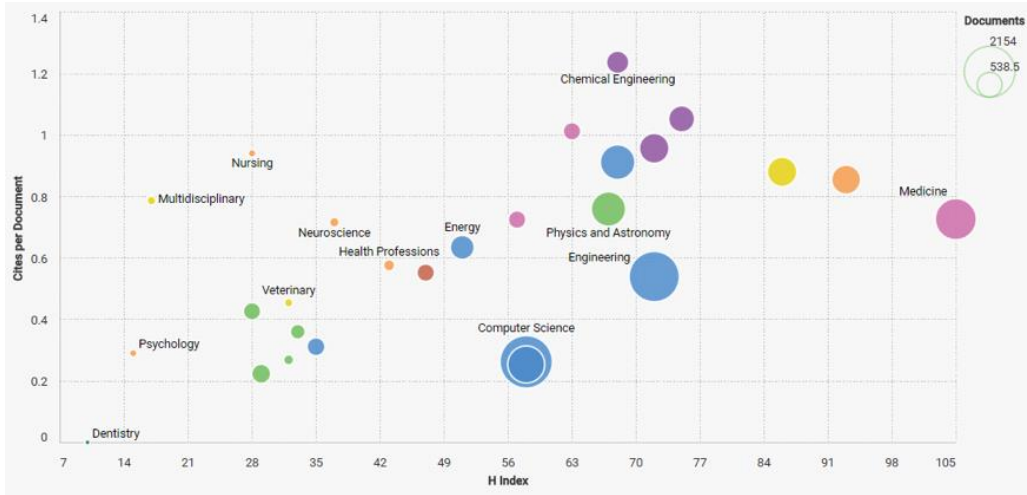
Source: Elaboration by Technopolis from Scimago Journal & Country Rank data

However, as shown in Figure 10, below, the quality of Tunisia’s scientific publications varies widely across fields. During the year 2016, the top three subjects of publication were Computer Science (28% of yearly publications are related to Computer Science); Engineering (26% of yearly publications are related to Engineering) and Medicine (17% of yearly publications are related to Medicine).¹⁵ Based on the H Index, publications in Medicine have the largest impact. Interestingly, despite the low number of publications in Chemical Engineering, this subject has the highest average number of citations per document. Combining this with the low level of the H Index in this field suggests that only some publications are widely cited.

¹⁴ Proposed 2005 by Jorge E. Hirsch, the H Index is an indicator of scientific impact. It is an author-level metric based on a person’s number of papers and citation number. The index can also be used as a group-level metric (like countries or universities, for instance).

¹⁵ When considering all the scientific production over the period 1996-2016, these fields remain the most prominent.

Figure 10 Quality of Tunisia's scientific publications across fields (H Index, documents published in 2016)



Source: Elaboration by Technopolis from Scimago Journal & Country Rank data

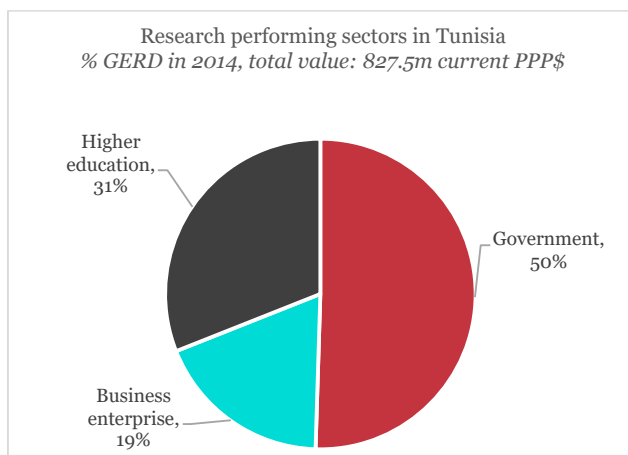
3 LANDSCAPE OF RESEARCH PERFORMERS

In this chapter we first provide an overview of the key characteristics of the Tunisian R&I system to then present more in detail the actors in the scientific research system (Section 3.2) and the innovation system (Section 3.3) and present the Tunisian technoparks and competitiveness clusters (Section 3.4).

3.1 Overview

In Tunisia, the government sector accounted for half (50%) of the government expenditure for R&D in 2014 (Figure 11), while the Higher Education Institutes accounted for 31% and business enterprises for 19%.

Figure 11 Research performing sectors – share of GERD, 2014



Source: UNESCO Institute for Statistics (UIS), Latest available data April 2018

There has been close-to-no change in the funding sources for the specific R&D performers since 2010. The UIS data suggest a total **lack of cross-financing** between the public and private sector (Table 5). Funding for R&D by the business enterprise sector is fully absorbed by actors in the private sector, while R&D funded by government and institutions abroad is performed only by the actors in the public sector. The Higher Education institutions account for (only) approximately 40% of the R&D funding in the public sector.

Table 5 Sources of R&D funding versus R&D performing sectors, 2015

R&D performed by	Funding (in m current PPP\$) by			Total (in m current PPP\$)
	Business	Government	Abroad	
Business	153.1	0	0	153.1
Government	0	384.8	32.1	417.9
Higher education	0	256.5	0	256.5
Total (in m current PPP\$)	153.1	641.3	32.1	827.5

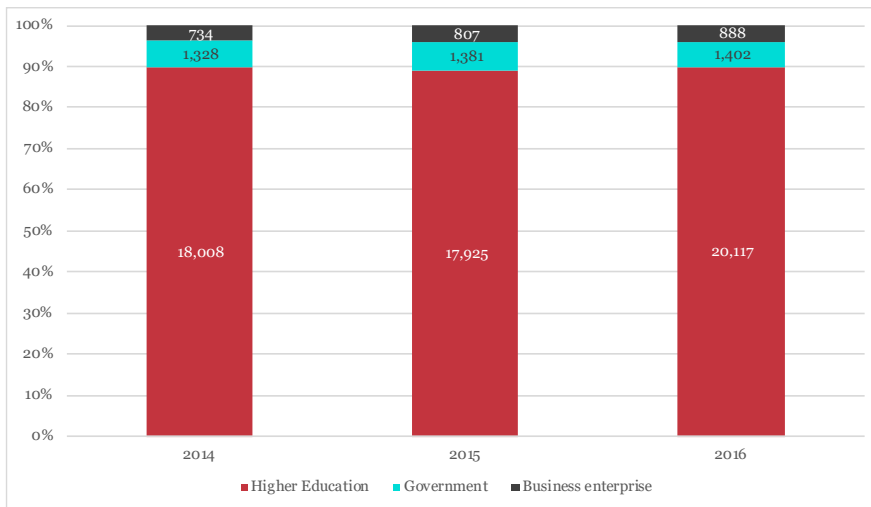
Source: UNESCO Institute for Statistics (UIS), Latest available data April 2018

Tunisia has a **high researcher density** compared to other countries in the region. Tunisia had 20,113 FTE researchers in 2015 (34,589 in terms of head counts), which constituted an increase of 5,386 (or more than 25%) compared

to 2010 (UNESCO Institute for Statistics, 2018). This stands for 4.9 FTE researchers per thousand labour force, which is high compared to the other countries in the region.

Despite its low levels of government funding mentioned above, the Higher Education (HE) sector accounts for the overall majority of FTE researchers in Tunisia (~90%) (Figure 12). The government sector accounts for ~6% of the total FTE researchers, and the private sector for ~4%.

Figure 12 Share of FTE researchers in the R&D performing sectors, 2014 - 2016



Source: UNESCO Institute for Statistics, August 2018

In absolute numbers, we note a rise of about 12% in number of FTE researchers employed in the Higher Education sector in 2016 (compared to 2014), and a 20% rise in the private sector.

It should be noted, though, that academic staff in Tunisia automatically gains the status of researcher; each academic staff member accounts for 1 FTE researcher.

In addition, the PASRI Diagnostic of the Tunisian national research and innovation system published in 2015 notes that statistics on researchers in Tunisia include a *significant proportion of master's and PhD students*. Data provided by the Ministry of Education and Scientific Research (MESR) confirm that 14% of the FTE researchers are professors, while 52% are PhD students.

The MESR also informs that slightly more than 30% of the researchers are active in the field of 'natural sciences' and only a slightly lower number in the field of 'life sciences and biotechnology' (Table 6).

Table 6 Scientific specialisation of the researchers

Research areas	%
Natural sciences (SE)	33
Life sciences and biotechnology (SVB)	29
Humanitarian, social science and economics (SHSE)	24
Engineering sciences and technologies (STI)	13
Total	100

Source: Presentation during the PSF kick-off meeting, March 2018

3.2 The research system

One of the key characteristics of the Tunisian research and Higher Education (HE) system is the high level of **institutional density**. Tunisia has a higher number of higher education and scientific research institutions than many research-intensive countries and the average in the EU. Tunisia has about 18 higher education and scientific research institutions per million inhabitants compared to less than 5 in France, Germany, Greece, Sweden, Belgium and Italy.¹⁶

This high number of Tunisian research institutions causes **fragmentation in financial and administrative resources**, as well as problems for **knowledge management**.

The Tunisian scientific research system currently entails 329 research laboratories and 301 research units distributed across the universities and research centres. In 2016-17, the research labs involved in total about 7,000 researchers (i.e. 2,314 researchers of level A and 4,933 researchers of level B); the research units accounted for about 4,000 researchers (1,327 researchers of level A and 2,880 researchers of level B) (MESR).

Since 2009, a minimum 14 researchers is legally required for the constitution of research laboratories and research units, among which: two researchers with a rank of professor of higher education, associate professor or equivalent grade; six researchers with a rank of assistant professor or equivalent; and six PhD students or other technical staff with a degree equivalent to the grade of assistant professor of higher education.

These research labs and units are established in:

- 13 public universities (one of which virtual offering long-life learning and online programmes), with 205 higher education and scientific research institutions and 37 doctoral schools
- 39 national research centres, including 21 research centres with active units and labs recognised by the National Authority for Evaluation of Research Activities

In addition to universities, academia is enriched by a network of ISETs (Instituts supérieurs des études technologiques) that delivers degrees for initial training, vocational training in close partnership with centers of technological resources, centres of competence and business incubators (Mondher, 2015). The 203 public

¹⁶ Global Innovation Index 2017: Tunisia total population 11,4 million inhabitants

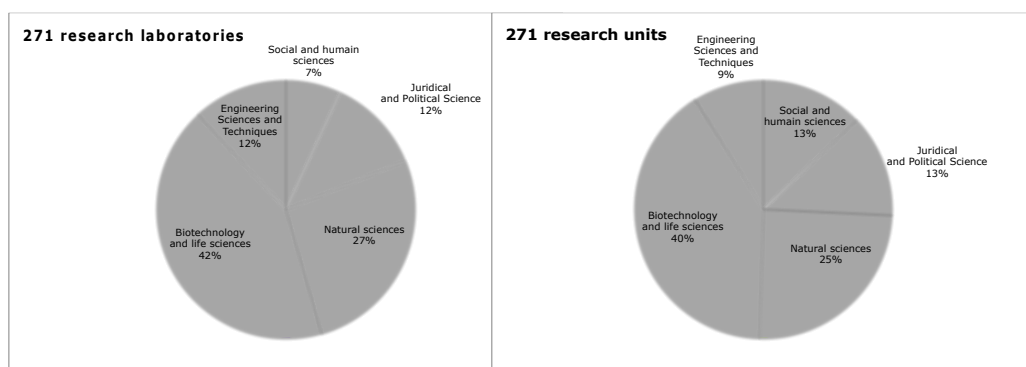
Higher Education institutes have 250,000 students; the 71 private institutions have 30,000 students.

The country is strongly marked by **territorial inequalities** also in its research system. About half of research laboratories and research units were located in the Greater Tunis region in 2013. An additional 30% of research laboratories and about 40% of research units were located in the Sahel region, mainly in Sfax, Sousse, and Monastir (HASSAN, 2015).

Not only are financial resources are fragmented between a large number of research teams, they are also scattered among **several scientific disciplines** (Figure 13 and Table 7). As a result, these small research teams struggle to reach a critical mass and enhance their visibility (HASSAN, 2015).

The strong focus on the **life sciences and biotechnology** is striking.

Figure 13 Distribution of research areas of Tunisian laboratories and research units, 2015



Source: ANPR/PASRI, 2015

Table 7 Number of doctoral schools per field of research and field of activity, 2015

Fields of research	No of doctoral schools	No of research centres	No of HE research labs	No of HE research units
Social and human sciences	7	10	23	52
Juridical and Political Science	10		31	38
Social, economic, and human sciences			97	77
Natural sciences	6		136	
Biotechnology and life sciences	7	11		131
Agriculture & biotech		5		
Medical sciences		13	29	29
Engineering Sciences and Techniques	7			
Total	37	39	316	327

Source: ANPR/PASRI, MESR, 2015

The 2015 PASRI bibliometric study (PASRI, 2015) categorises the Tunisian research institutions in four categories: universities, research centres, public health institutions (hospitals and government labs - EPS), and 'other' which comprises the ministries and governmental agencies, private enterprises, NGOs etc.

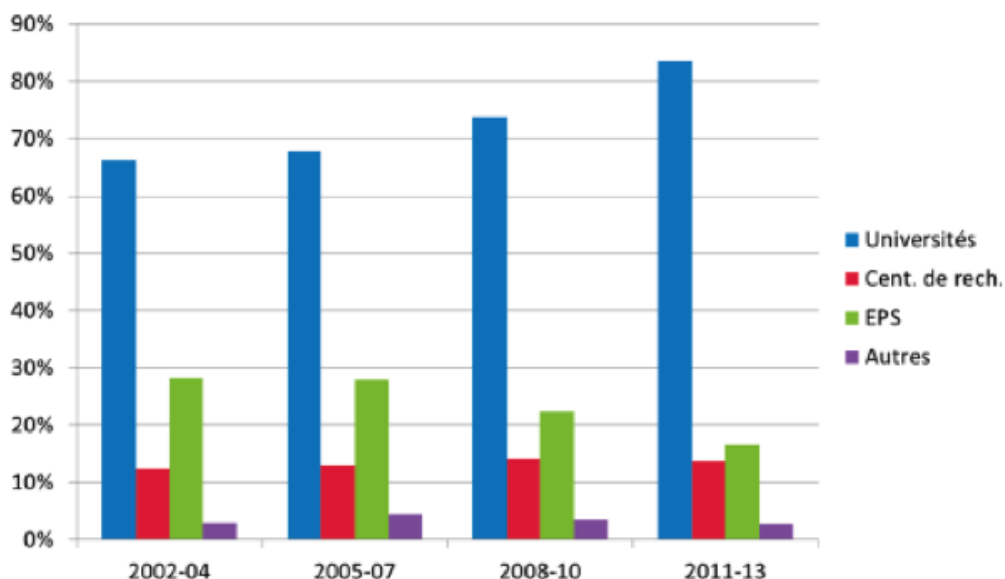
In terms of their scientific production, the main findings were (Figure 14):

- The **universities** contributed in 2002-2013 to about 70% of the scientific production; in 2011-13, the HE sector contributed to about 80% of the articles. Major contributors are the university of Tunis El Manar, the university of Sfax, the university of Carthage and the university of Monastir
- The **public health institutions** (hospitals and government labs) contribute to about 20% but had a slower growth path than the universities
- The **research centres** account for in total 13%; their contribution is relatively modest and stable between 2002 and 2013. Three centres contributed with more than 500 publications: the Centre de Biotechnologie de Borj Cedria, Centre de Biotechnologie de Sfax, and l'Institut Pasteur. Other centres where the scientific production has considerably grown in the last decade are: le Centre National de Recherche en Sciences des Matériaux, le Centre de Recherche et des Technologies de l'Énergie de Borj Cedria, le Centre de Recherche et des Technologies des Eaux de Borj Cedria, le Centre Régional des Recherches en Horticulture et Agriculture Biologique, l'Institut National des Sciences et Technologies de la Mer.

The other institutions play a relatively minor role in the Tunisian research system.

The only private enterprises with publications indexed in Scopus during 2002-2013 are the state-owned Entreprise Tunisienne d'Activités Pétrolières (21 articles), STMicroelectronics NV (18 articles), Siemens AG (1 article) and General Motors Corp. (1 article).

Figure 14 Scientific production per sector, 2002-2013 (Scopus)



Source: Etude bibliometrique sur la recherche tunisienne, Science Metrix, 2015

An extraction from the Scopus database indicates that 67,416 scientific publications were authored or co-authored by Tunisian researchers over the period 1990-2016. These publications include four types of documents: articles, papers, reviews and book chapters. Since researchers are affiliated to research centres or universities, one can look for the most productive organisations which could be considered as the main centres of knowledge production in Tunisia. In this vein, the **Universities of Sfax and Tunis** are by far the most scientific research-productive universities in Tunisia.

3.3 Key actors in the innovation system

3.3.1 Technical Centres

The industrial technical centres work under the umbrella of the Ministry of Industry and are considered “interface infrastructures”, providing services to industry for testing, prototyping etc.

Technical centres include: the Technical Centre for the Wood and Furniture industry; the Technical Centre for the Mechanical and electrical industry; Technical Centre for Chemistry; Technical centre for the textile industry; Technical centre for Leather and footwear; Technical centre for the Agrofood industry; Technical centre for the Packaging industry; and the Technical centre for aquaculture.

3.3.2 Industry actors in R&D

SMEs are the engine of Tunisia’s private sector economic growth. The Tunisian industrial landscape is mainly made of small and medium sized companies (SME). Tunisia had 624,000 micro and small enterprises in 2014 which accounted for 99.7% of the total number of enterprises in the country and employed around

1.2 million workers (i.e. about 44% of the formal private sector work force) (World Bank, 2014).

The main consequence of the prevalence of SMEs in Tunisia's economic landscape is that all economic development strategies are de facto based on the performance of this category of companies. The SMEs' ability to obtain support for their R&D investments is therefore crucial to Tunisia's future economic development.

Results from the Enterprise Surveys conducted by the World Bank in 2013-2014 in Tunisia (an overview of the survey sample is available in Appendix C) highlight the small proportion of companies with more than five employees that introduced a new product or service during the last three years preceding the survey.

Table 8 Innovation and technology among businesses surveyed through World Bank Enterprise Surveys, 2013

Indicator	Tunisia	Middle East and North Africa
Percent of firms using technology licensed from foreign companies*	8.1	6.6
Percent of firms having their own Web site	66.3	47.2
Percent of firms using e-mail to interact with clients/suppliers	93.6	64.9
Percent of firms that introduced a new product/service	27.6	26.0
Percent of firms whose new product/service is also new to the main market	55.2	63.7
Percent of firms that introduced a process innovation	35.2	30.8
Percent of firms that spend on R&D	18.0	11.1

Source: World Bank, Enterprise Surveys 2013 (Core Module) .

The survey results also show a strong positive relationship between the size of companies in Tunisia and the share of companies that had internal or external R&D expenditures in the last three years. In addition, Tunisian companies with foreign capital - and especially exporting firms - are more engaged than domestic and non-exporting companies in internal and external R&D activities (Table 9) (HASSAN, 2015).

In sum, the country's industrial R&D and innovation capacities are still insufficient, especially in non-export oriented small businesses (the on-shore sector).

Table 9 Profile of Tunisian businesses with more than five employees that have introduced an innovation in the past three years and type of innovation, 2013

	Total (%)	Size (%)			Propensity to export (%)		Ownership structure (%)	
		Small (5-19)	Medium (20-99)	Large (100+)	Direct exports of over 10% of sales	Direct exports less than 10% of sales	Domestic	10% or more of foreign ownership
Product innovation (new to the company)	28	28	27	27	33	26	26	42
Product innovation (new to the market)	15	13	19	17	18	14	13	28
Process innovation	35	32	40	40	41	33	34	45
Process and product innovation (new to the company)	19	19	19	19	23	18	17	31
Process and product innovation (new to the market)	12	9	16	15	14	12	11	23
Organisational innovation	21	17	25	28	23	19	19	31
Marketing innovation	25	22	29	31	24	25	25	26
Internal or external R&D	18	14	22	25	25	15	17	23

Source: World Bank, Enterprise Surveys 2013 (Core Module); Notes: Survey among 592 businesses from manufacturing sector and market services.

3.3.3 Business Incubators and accelerators

Next to the network of "Start-up nurseries" owned by the State, which are switching gradually to the Business incubators model, several initiatives were launched in the private sector and civil society to support innovation better to serve the 250 Start Ups hosted per year. The most significant entities are the following:

- **Wiki Start Up**, the first private Business Incubator launched by Carthage Business Angels network which has an own seed fund named CapitalEase
- **Start Up Factory / IntilaQ for Growth Fund** launched by the Telco operator Ooridoo and the Tunisian-Qatari Friendship Fund.
- **ESPRIT Incubator** launched by the private University leader in the field of ICT in partnership with the association Tunisie Croissance, backed by Tuninvest Fund
- **Yunus Social Business**, the accelerator launched recently by Yunus Foundation in partnership with the African Development Bank to promote social innovation and contribute to the Social Business Development in Tunisia.

3.4 Technoparks and competitiveness clusters

Technoparks and competitiveness clusters promote scientific research and technological innovations in areas related to national priorities, encourage incubation and creation of innovative companies, promote public - private partnerships, and support innovative projects with high value added.

While technoparks are legal entities with an operational budget and management structure, competitiveness clusters are more loose associations. Three **clusters** have been created so far in the sectors of mechatronics, textile and pharmaceuticals.

- The Cluster Mechatronics of Tunisia (CMT) is a grouping in synergy with the competitiveness pole of Sousse, related to the mechanics, electrical, electronic and informatics sectors
- The Cluster Technical Textile is created around the competitiveness pole of Monastir
- Recently a cluster related to the pharmaceutical industry has been created in close collaboration with the technopark of Sidi Thabet.

Other clusters are being set up in the field of agrofood and ICT, respectively related to the technoparks of Bizerte and Sfax. Tunisia's industrial strategy for 2016, prepared by the Ministry of Industry, established clustering as one of its key growth factors to anchor innovation.

The **technoparks** bring together in one physical place research centres, industry actors, incubators, and in some cases, centres for technological resources. They focus on the local industry (in majority made up of SMEs), attracting them through the availability of physical space at advantageous conditions, as well as access to on-site services for research, space and management.

As illustrated in Figure 15, the technoparks generally have a sectoral expertise in line with local specialisation of industry and their maturity level is variable.

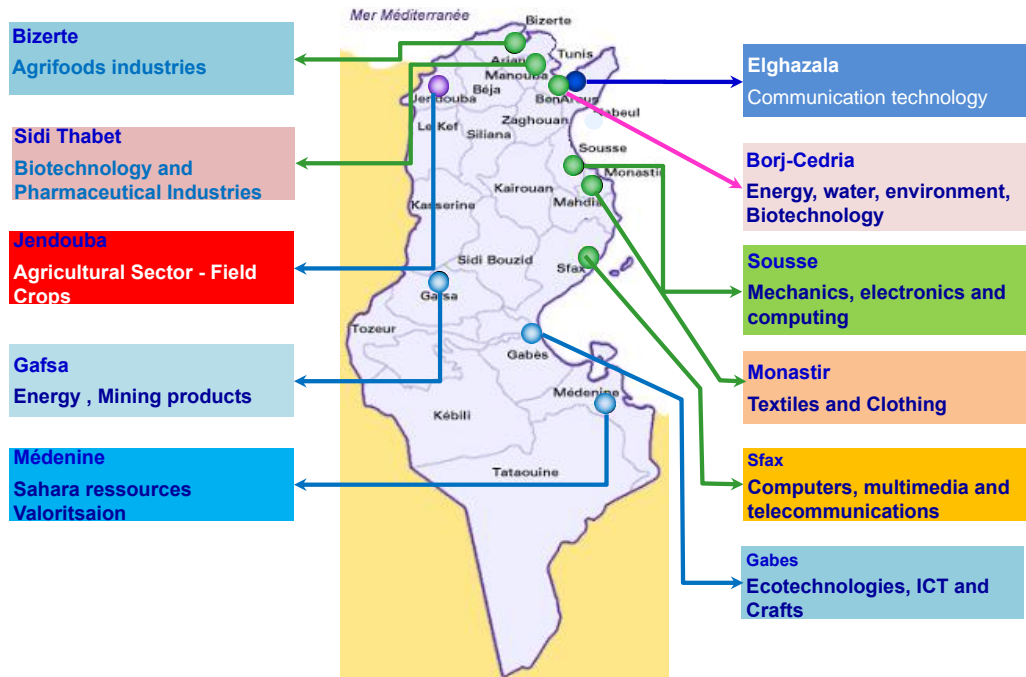
Elgazala Technopark in the Tunis region was the first technopark, both for Tunisia and the Maghreb. Established in 1997, it specializes in communication technologies and now hosts about 80 companies, including 13 multinationals (Microsoft, Ericsson, Alcatel Lucent, etc). Several other technoparks have been established since, including those in Sidi Thabet (2002, for biotechnology and pharmaceuticals), Borj Cedria (2005, for environment, renewable energy, biotechnology and materials science), Monastir (2006, for textiles) and Bizerte (2006, for the agro-industry) (UNESCO, 2015).

In 2012, the government announced the creation of a new technopark in Remada specializing in ICT. Meanwhile, the Ecosolar Village of Zarzis–Jerba should soon be operational. It will create jobs in renewable energy production, seawater desalination and organic farming; this technopark also plans to position itself as a training platform for the entire African region. Tunisia intends to raise the share of renewables in the energy mix to 16% (1 000 MW) by 2016 and to 40% (4 700 MW) by 2030, within its Solar Plan adopted in 2009 (UNESCO, 2015).

In November 2013, the government signed an agreement with France Clusters, which groups French technoparks, for the provision of training and advice on the creation of new technoparks in Tunisia. Elgazala and Sidi Thabet Technoparks are both members of the International Association of Science Parks. Gafsa

Technopark, which specialises in useful chemical substances, has been designed in partnership with the Korean International Cooperation Agency; it is being funded by the government, the park management companies and the tandem formed by the Chemical Group and the Compagnie des phosphates de Gafsa (UNESCO, 2015).

Figure 15 Location and specialisation of the technoparks ('technopoles')



Source: presentation by Prof. Chedly Abdelly, ANPR, Ministry of Education, PSF kickoff meeting (March 2018)

In some technoparks (Monastir, Sousse, and in the future also in Borj Cedria and Sfax), 8 technical centres or **Centres for Technological Resources** have been set up, which are meant to act as platforms for development, serving all research centres and industry actors present in the technopark. Their management style is diverse, depending on the local arrangements. The board of directors in each technical centre is financed by the industry, with 90% financial autonomy. However, there is no funding for their R&D work, which is mainly funded through competitive calls by PNRI.

Some of the technoparks also host **incubators for start-ups** (e.g. Sidi Thabet BiotechPole), which either depend directly from the technopark management (the best functioning model according to interviewees) or are co-managed by the technopark and the Ministry of Industry.

Currently, departments in the MESRS and the Ministry of Industry manage the technoparks. Newer technoparks that are being established, such as the BiotechPole, are adopting a private management style, with a CEO drafting a development roadmap, distancing themselves from previous 'fonctionnaire' style type of management, as was the case prior to the 2008 revolution.

Performance and management of the technoparks

The PASRI Diagnostic of the Tunisian R&D and innovation system highlights that no information or data relating to the **performance** of these structures is available. Furthermore, no baseline data was compiled to assess progress.

The report indicates that many technopoles and clusters, including the most mature ones, do not have strong business plans and roadmaps to support their development and strategic positioning. Besides, most of the technopoles and competitiveness clusters lack qualified personnel and financial means to run their activities. There are, however, examples of good practice, such as the PharmaIn cluster, based in the BiotechPole, managed by a private CEO. The cluster provides 'animation' services to companies, supporting collaborative projects based on funding from the COLLABORA programme of MESRS. In addition, the cluster aims to set up a 'hotel d'entreprises' to facilitate the transition from the start-up phase and growth towards more mature enterprises.

Technopoles and competitiveness clusters operate in an **incomplete, complex and incoherent legal and regulatory framework**, based on Law No. 2001-50 of May 3, 2001 and Law No. 2006-37 of June 12, 2006. This juxtaposition of legislation led to the definition of different categories of management companies (non-administrative public enterprises, private companies accredited for this purpose, consortium of companies for the management of technological poles, economic interest groups) following different legal regimes. As a result, the landscape of the Tunisian technopoles system on the ground is not aligned with the current legal framework, which has serious repercussions on their management. These entities have different economical logics and business models, and according to the PASRI report, many have difficulties to access sufficient financial resources to carry out their missions because the legal framework does not enable them access to existing financial mechanisms.

4 GOVERNANCE OF THE R&I SYSTEM

In this chapter we first set out the structure set up for the governance of the R&I system. In Section 4.2 we cover the recent government R&I policies and R&I priorities, including the process for their definition. Section 4.3 describes some of the key challenges related to R&I governance as they emerged from the PASRI reports and the first interviews conducted in the context of this PSF study,

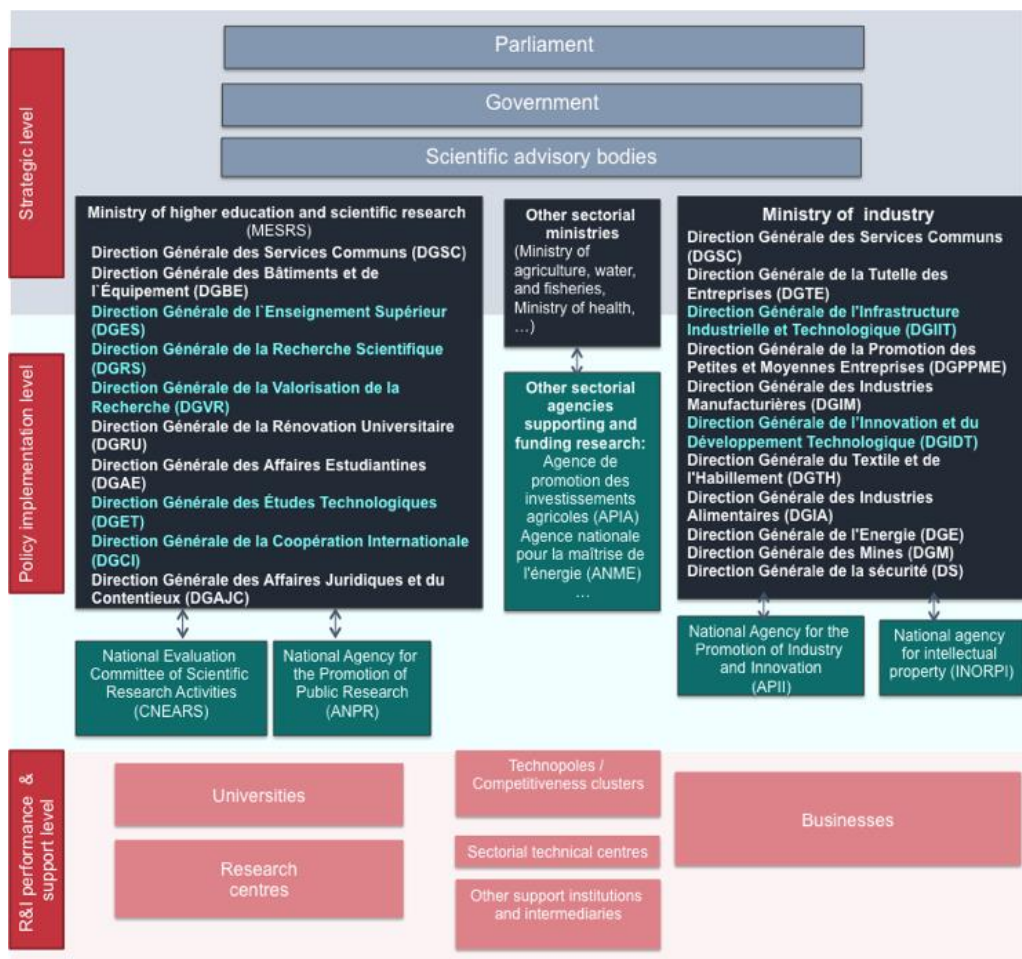
4.1 The R&I governance structure

R&I policy in Tunisia is developed, funded and implemented at the national level.

In recent years there has been a strong emphasis in the political debate on the need for more concerted activities and a more inclusive decision-making process to shape the Tunisian R&I system, including businesses and the civil society.

Figure 16 presents the governance structure of the Tunisian RDI system in 2015.

Figure 16 Simplified representation of the governance of Tunisian research and innovation system



Source: PASRI Diagnostic of the Tunisian R&D system, 2015. Technopolis adaptation, 2018.

At the political level, Parliament, i.e. the “Assemblée des représentants du peuple”, and government ensure the highest level of governance. The Parliament adopts the laws promulgated by the President. The government sets the political direction and coordinates policies.

In their missions, they can be assisted by **advisory and / or coordination bodies**. However, advisory and coordinating bodies that supported orientation and programming functions such as the National Advisory Council for Scientific Research and Technology (CCNRST), the Higher Council for Scientific Research and Technological Innovation, and the High Level Council for Science and Technology are no longer active. The post-revolution period has impacted the strategic level with many of the RDI advisory bodies becoming inactive.

According to the PASRI reports, these advisory councils have not functioned due to the fact that their mission and tasks were not properly defined. There currently seems to be the intention to set up a “Strategic council for research and

innovation”, which would include representatives from all ministries, research and industry, with the aim to institutionalise coherence, define the mission of the R&I system and ensure that specific policy outcomes are defined, evaluated, etc.

The **Ministry of Development and International Cooperation** has taken up the role of coordinating the ministries for the development of Tunisia's new Five-Year Development Plan. This plan defines the strategic orientation of all public policies that have an impact on the economic and social development of the country, including research and innovation.

At the interface between the political and policy implementation level are the **Ministry of higher education and scientific research** (MESRS), the **Ministry of Industry** (MoI), and sectoral ministries with responsibility for R&D in certain fields such as health, agriculture, ICT, environment and energy.

The main policy function has been divided between the MESRS and the Ministry of Industry. These two ministries are the two pillars of this level and form the institutional governance of R&D and innovation policies. They are in charge of policy development and financing, its management and monitoring.

A frequent criticism in the past was that this dual structure – and especially the lack in coordination between the MESR and the MoI - has hampered a coherent and systemic approach to RDI policy interventions. The descriptions below of the ministries’ responsibilities show overlaps in their missions. There are also overlaps in the missions of these ministries and their respective implementation agencies (ANPR and APII). Nevertheless, recent evidence shows that several efforts are being made to enhance the collaboration between the two ministries.

At a lower level are the **implementation and funding agencies, research councils and academies, and support agencies under the umbrella of the different ministries**. These agencies, councils, and academies generally have the role of implementing departmental policies, their funding, intelligence and support activities.

At the research performance and support level, there are R&D performing institutions, such as higher education institutions, public, semi-public, or private institutions. non-for-profit R&D companies as well as institutions organising interfaces between the public sector research and the industrial world.

The public R&D performers function **under the umbrella of different Ministries**:

- Higher education and scientific research institutions and research centres are under the umbrella of the MESR and other sectoral ministries
- Industrial technical centres work under the umbrella of the Ministry of Industry
- Technoparks and clusters work following orientations of both the MESR and the Ministry of Industry

The role of the regions in R&I governance is very limited even at research performance level.

4.1.1 The Ministry of Higher Education and Scientific Research (MESR)

The MESR has the following functions:

- To elaborate and implement the higher education and scientific research policy
- To oversee activities of universities, higher education and research institutions and research structures
- To supervise academic life of students and coordinate the management of university services
- To coordinate and monitor higher education and scientific research international cooperation actions

The MESR is supported in its mission by its implementation agency the **National Agency for the Promotion of Scientific Research (ANPR)**. The ANPR is a public agency with administrative and financial autonomy placed under the MESR. It was founded in 2008 as an attempt to overcome the sectoral approach to the research, development and innovation policy. It gathered all stakeholders to produce a common ground for a coherent Innovation Agenda and has the mission to support interface agencies involved with scientific research, to assist the R&D programs and initiatives implementation, and to facilitate the Tech Transfer through collaborative projects and the PPP. More specifically the ANPR is in charge of:

- Supervising technology transfer offices in universities and research centres
- Assisting public research performers in intellectual property, commercialization and technology transfer
- Contributing to the implementation of national research programmes
- Disseminating information on innovation and programmes supporting technology transfer and commercialization of research results
- Contributing to the better use of scientific and technological intelligence
- Advising on acquisition, maintenance and exploitation of heavy scientific equipment
- Financial management of research projects (upon request of research performers)
- Acting as an intermediary between public research actors and businesses or international partners

The MESR has also launched the pilot phase of the implementation of the first generation of BuTT (Bureau de Transfert de Technologies), ie **Technology Transfer Offices (TTO)** that act as local interfacing structure and skills center serving the exploitation of research results, transfer and partnership between supply and technology demand. Their role is to set up a structured process of IP management in support to the Technology transfer between the University and the Enterprise. Thirteen universities, research institutions, research centers and technology parks were selected so far.

Tunisia is an associate country of H2020 since January 2016 and the MESR has created a **dedicated Directorate-General** to ensure a sustainable integration

of institutions and stakeholders to the programme. To raise awareness of the opportunities of H2020 and build capacity for tapping into the funding, national networks have been set up by theme. The MESR also organised 60 infodays in collaboration with the agency of the MoI (APII) as capacity building for the private sector.

The support system in place for mobilising stakeholders for H2020 consists of Scientific Councils – who can pilot networks and decide on the national technical networks, project cells. Members of the diaspora with academic credentials are also part of the support network. Moreover, officers from sectoral ministries or relevant university or research centres (with a PhD) are appointed to be thematic National Contact Points (NCPs) in a very dynamic structure. Only the NCPs are funded by the EC, while the other activities are nationally funded.

In 2017 the Direction Générale de Valorisation de la Recherche of the MESR has also carried out a number of activities to strengthen the transfer, utilisation and commercialisation of research results and thus to enhance the impact of Tunisian research. This included the organization of the work of **the commission in charge of implementing the reform "utilisation and internationalisation of research results"**. The commission gathered during several month 20 representatives of the Tunisian innovation ecosystem and socio-economic actors: the Ministry of Industry, APII, SMEs, INNORPI, technical centres, the Tunisian Union of Industry, Commerce and Crafts (UTICA), the Tunisian General Labour Union (UGTT), the MESRS, technopoles, researchers, and the Institution of Agricultural Research and Higher Education (IRESA).

The commission made a number of suggestions (Khanfir, 2015):

- The creation of innovation spaces in Universities and technopoles (technology transfer offices, technology resource centres, incubators)
- Creation of an academy for the training of new research support professions with expertise in intellectual property, contract management, feasibility studies, project set up and management
- Creation of an expert committee for innovative research (CERIV) to monitor scientific collaborations leading to patents that are not followed up by Tunisian researchers

4.1.2 The Ministry of Industry (MoI)

The Ministry of Industry's mission is to develop and implement government policy in areas related to industry, agri-food industries, industry-related services, energy, mining, industrial cooperation, and industrial energy and mining security. In the area of technology, the Ministry of industry is in charge of:

- Supervising the government's innovation and technology development policy
- Elaborating and monitoring the execution of programmes for the promotion of technological innovation
- Participating in collaboration with other Ministries such as the MESRS to the definition of training programmes in the area of innovation management
- Defining action plans for the development of sectorial technological capacities

- Taking part in the implementation of studies on development of technology transfer
- Monitoring applied research programmes targeting industry
- Ensuring the follow up of businesses in technopoles and sectorial technical centres
- Administrating applications for financial benefits allocated to investors in the areas of innovation and technological development

The Ministry of Industry is supported by the **Agency for the promotion of industry and innovation (APII)**. APII provides support services to entrepreneurs and enterprises. Its mission is to spread the culture of innovation among businesses by promoting programs of capacity buildings and incentives mechanisms. APII was created in 1972 and has 5 intervention centres with representations in 24 regional offices:

- The Center for Facilitation and Benefits Management (CFGA)
- The Centre for Industrial Prospective Studies (CEPI)
- The Centre for Innovation and Technological Development (CIDT)
- The Centre of Industrial Documentation and Information (CDII)
- The Centre of support for business creation (CSCE)

The CIDT is responsible for the promotion of innovation among SMEs, it supports businesses in the constitution of an R&D function, it promotes innovation funding mechanisms. The centre is in charge of identifying business with innovation potential, offering an innovation diagnosis to businesses, and supporting in the implementation of their innovation projects. The centre also acts as an Enterprise Europe Network (EEN), supporting SMEs in their internationalisation, innovation and technology transfer projects. Within this context, the agency organises the 'Days of technology transfer' in cooperation with MESRS, which has been facilitating business-to-research encounters, coupling 'mature' research products with industry needs.

APII also organises national innovation contests, which have been funded under PASRI since 2014 and target research centres, startups and individual researchers.

Given the number of privileges associated with Innovation, Tunisia has set a government agency, the Industrial Capacity Upgrade Office (Bureau de Mise à Niveau - BMN), in charge of the implementation of the industrial capacity upgrade programme, operating under the auspices of the Ministry of Industry to evaluate and deliver a certificate of Innovation to industrial companies who will apply for it. This document is needed in particular to access to public funds supporting R&D and innovation.

4.1.3 The other ministries

The national budget for research is divided among several ministries. Based on MESR data, the major beneficiary is the MESR, followed by the Ministry of Agriculture and the Ministry of Health that receive about 12% of the national budget each (Table 10).

Table 10 Public research funding – shares of Ministries

Beneficiary Ministries	%
MESRS	67
Agriculture	12
Health	12.5
Other departments	8.5
Total	100%

Source: MESR

The **Agency for Agricultural Investment Promotion (APIA** -Agence de promotion des Investissements Agricoles) is a public institution under the Ministry of Agriculture, Water resources and fisheries, dedicated to the promotion of private investment in agriculture, fisheries and related services as well as primary processing activities.

4.2 Research policy and priorities

Tunisia's higher education and scientific research policy is structured through the following orientations:

- **The strategic plan for the reform of the higher education and scientific research 2015-2025**¹⁷ sets five overall objectives for Tunisia:
 - OG1- Enhance the quality of university training and employability of graduates
 - OG2 - Promote research and innovation through a better governance of scientific research, promotion and strengthening of SHS, funding and infrastructure for research, improvement of the management of research human resources, develop a quality management system for research, better use of research results
 - OG3 - Promote good governance and optimize resource management
 - OG4 - Review the university map for a better support and regional balance
 - OG5 – Promotion of teacher training.
- In 2017 the Ministry of Higher Education and Scientific Research presented a **strategy for international cooperation in the field of higher education and scientific research** with 4 strategic goals:
 - To strengthen existing collaborations with Arab states and Europe

¹⁷ Plan stratégique de la réforme de l'enseignement supérieur et de la recherche scientifique 2015 – 2025

- To develop new partnerships promoting innovation with Asia
- To Market Tunisia as a higher education and scientific destination for Africa
- To promote mobility of researchers and students and transform brain drain in Tunisian Ambassadors
- In 2018 the MESRS launched a new programme within the framework of the Modernization of Higher Education in Support of Employability (PromESsE-Tn) project, dedicated to the exploitation of innovations emerging from research structures.

4.2.1 A strategy to build bridges between universities and industry

The University Council is presided by the Minister of Higher Education, Scientific Research and Information and Communication Technologies. In January 2015, the University Council approved a broad reform of scientific research and higher education that is to be implemented over the period 2015–2025.

The reform will focus on modernizing university curricula, in order to give graduates the skills employers need, and on giving universities greater administrative and financial autonomy. In 2012, the ministry had already taken a step in this direction by placing its relations with universities on a contractual basis for the first time.

The reform will also strengthen university–industry ties and revise the university map to ensure greater equity between regions. Central to this strategy is the ongoing development of technoparks, as they foster research and job creation in the regions.

4.2.2 Priorities, future directions, and key initiatives for Scientific Research for 2017-2022

In August 2017, the Ministry of Higher Education and Scientific Research (MESRS) published a national strategic document presenting Tunisia’s priorities, future directions, and key initiatives for Scientific Research by 2017-2022.¹⁸ This strategic document demonstrates the government’s willingness to address recommendations from the PASRI diagnostic report and willingness to better connect scientific research to the country’s socio-economic challenges. However it does not set quantitative targets for R&I, nor evaluation criteria for each level of objectives.

The **five-year strategic plan** includes **20 specific objectives and 60 initiatives** (illustrating the ‘operational’ objectives) designed to achieve them. The objectives and initiatives are divided into four ‘levels’ or categories as presented in Table 11, below.

¹⁸ <https://www.slideshare.net/KhalilAmiri/tunisie-recherche-scientifique-20172022-priorites-orientations-futures-et-initiatives-c>

Table 11 Strategic objectives established in the strategic plan 2017-2022

Levels	Strategic objectives
Level 1: National strategy and policy coherence and steering resources towards priorities	<ul style="list-style-type: none"> • SO 1 - Promote the coherence of the national SRI system and improve coordination among stakeholders • SO 2 - Formally identify national priorities and steer resources and activities toward priorities • SO 3 - Diversify international cooperation programs and ensure their alignment with national priorities
Level 2: Research system organisation, funding and evaluation	<ul style="list-style-type: none"> • SO4- Migrate to a competitive transparent project-based research funding system aligned with priorities • SO5- Increase the funding of scientific research to 1% of GDP by 2022 • SO6- Establish research centres of excellence and build their capacities • SO7- Enhance the effectiveness of the reporting and evaluation systems
Level 3: Governance, quality assurance, and management of research labs and centres	<ul style="list-style-type: none"> • SO8- Enhance the administrative and financial autonomy of HER institutions and modernise their management • SO9- Establish a quality assurance system in research institutions and laboratories • S10- Ensure optimal use of valuable scientific equipment and further develop research infrastructure • S11- Promote the quality of doctoral training programs • S12- Promote incentives for research personnel and leverage the network of Tunisian competencies living abroad • S13- Promote ethical standards in scientific research
Level 4: Leveraging research results – knowledge dissemination, technology transfer, and the creation of innovative start-ups	<ul style="list-style-type: none"> • S14- Promote the mobility of student researchers to the socio-economic environment • S15- Promote the system and culture of intellectual property protection • S16- Promote the governance of techno parks and establish the missing components of the parks • S17- Accelerate the process of technology transfer and the creation of innovative start-ups • SO18- Widely disseminate the outputs of the research system and raise awareness about its capacities and results • SO19- Strengthen the links between research units/labs and their socio-economic environment • S20- Promote research and innovation within the private sector and within private higher education institutions

The strategic document also defines **6 thematic priorities** for scientific research and their related specialisation areas.

Table 12 Thematic priorities in the strategic plan 2017-2022

Thematic priority	Specialisation areas
Water, energy and food security	<ul style="list-style-type: none"> • Sustainable management of water resources • Renewable energies and energy efficiency • Preserving biodiversity and acting on climate change • Smart agriculture, locally adapted automation, and exports • Pest and disease management, desertification and coastal erosion
Emerging democratic society: education, culture and youth	<ul style="list-style-type: none"> • Identity, citizenship, and emerging democratic society • Education, training, quality assurance, and new teaching approaches • Culture, arts, media, and quality of life • Youth issues
Quality healthcare	<ul style="list-style-type: none"> • Drug design • Health economics and health system governance • Demographic transition, and well- being • Quality of healthcare and e-health
Digital and industrial transition	<ul style="list-style-type: none"> • Digital transition • Smart cities and internet of things • Security of information systems and networks • Infrastructure and border surveillance and security • Nanotechnology and smart materials
Governance and decentralization	<ul style="list-style-type: none"> • Political and economic decentralisation • Local governance and participative democracy • Regional development models • Capitalising on the historical and cultural heritage of the regions • Governance of public and private companies and public service reform
The circular Economy	<ul style="list-style-type: none"> • Sustainable agriculture and industry • Mineral resources and rare earth metals • Fighting pollution and its effects • Treatment and recycling of household and industrial waste

4.2.3 Process for the research priority setting

The national priorities listed above were defined through a **National Consultation on scientific research priorities** launched in November 2016 and concluded in May 2017. It involved about 2000 representatives of all stakeholders—research centres, universities, public institutions and ministries, business and labour organizations, and civil society associations.¹⁹

¹⁹ Scientific Research: Priorities, future directions, and key initiatives 2017-2022

The definition of strategic priorities for the research system was led by the Ministry of Higher Education and Scientific research (MESRS) following a methodology that was:

- Participative: a co-construction approach
- Inclusive of all stakeholders
- Dynamic: the choices are scalable in time (over the years) and in space (the regions).

The methodological approach followed the following steps:

- A first list of general themes was established by the MESRS based on the results of the PASRI analysis and an international benchmark study.
- Online national consultations were organised to refine the list of general themes (11 Oct.&14 Dec.2016).
- The methodological choices were presented and discussed.
- Workshops were organised to determine evaluation and prioritisation criteria in the selection of national priorities (brainstorming and scoring method).

The key purpose of the consultation with the researchers was to set up a participatory platform. Industry has been given the opportunity for feedback.

The top-down prioritisation has happened at the level of ministries when integrating the sectoral ministries' strategies, based on papers from the different ministries. There is no evidence indicating that the research quality / strengths have been considered as criteria for the prioritisation.

Table 13 Criteria of the selection and prioritisation of national priorities

Criteria	Sub-criteria
Importance of current or potential value added	<ul style="list-style-type: none"> • National or local societal impact (quality of life, contribution to social progress, regional positive discrimination ...) • National or local economic impact (local demand, employment, export, regional positive discrimination ...) • Innovation and scientific excellence
Importance of alignment and engagements	<ul style="list-style-type: none"> • Alignment with national sectoral or inter-sectoral strategies (security, health, agriculture, energy, transport, economy, education...) • International integration (international agreements and engagements signed by Tunisia)
Degree of feasibility (availability of resources and capacities)	<ul style="list-style-type: none"> • Importance of existing opportunities, resources and capacities: human resources (experience, competencies, skills, critical mass of research teams) • Feasibility of R&I regarding local and international context and environment • The unifying / transversal / multidisciplinary character of research
Emergency level	<ul style="list-style-type: none"> • The emergency level: for example dangers for the State or population: terrorism, epidemic, natural disaster, cyber attack ...)

Source: MESRS, Methodologie de détermination des priorités nationales

A weighting of the selection criteria was applied to help in the selection and prioritisation exercise. 10 out of 19 general themes or challenges were selected

during a brainstorming exercise where participants were asked to individually or collectively (in small groups) prioritise the list of challenges for the research system. Each challenge was given a score from 0 (non-existent) to 5 (very important). Scoring was then gathered and consolidated, and challenges discussed and grouped in categories. A weighted sum was calculated for each challenge.²⁰

- Regional seminars were organised to discuss the 10 challenges identified and adjust prioritisation to reach 6 general thematic or challenges for Tunisia's research system
- For each of the 6 general thematic selected a workshop was organised to specify sub challenges by thematic (during the third national days for the dynamization of R&I²¹ organised on 16 & 17 December 2016)
- A verification of the overlap of results with sectoral strategies and five-year strategic plans of the different ministerial departments was performed (3 February 2017)
- Regional seminars to present and adjust results obtained were organised in:
 - Sousse: March 1, 2017 (Universities of Sousse, Monastir, Kairouan, Zeitouna)
 - Gabes: March 7, 2017 (Univerities of Gabes, Gafsa, Sfax)
 - Tunis: May 6, 2017 (Univerities of Tunis, Manar, Carthage, Manouba, Jendouba, UVT)
- A consultation was carried out with socio-economic actors for example the Tunisian Union of Industry, Trade and Handicrafts (UTICA), the Tunisian General Labour Union (UGTT), the Tunisian Union of Agriculture and Fisheries (UTAP)
- A national seminar for the presentation and validation of final results was organised
- A strategic document presenting Tunisia's priorities, future directions, and key initiatives for Scientific Research by 2017-2022 was published in August 2017 (Centre National Universitaire de Documentation Scientifique et Technique, 2017)

²⁰ Scoring methodology was based on a Decision Matrix Analysis following guidance available here: https://www.mindtools.com/pages/article/newTED_03.htm

²¹ 3ème Journées nationales de dynamisation de la R&I

4.3 Issues in the R&I governance

4.3.1 Findings of the 2015 PASRI review

Governance of the research, development and innovation (RDI) system has been characterised by difficulties in setting overarching strategic direction and defining national priorities and system-level evaluation criteria, a fragmented institutional structure leading to complex and unclear division of functions, and challenges to ensure policy coherence across sectors and ministries.

In 2015, the PASRI diagnostic of the Tunisian R&D system (HASSAN, 2015) highlighted a **lack of political leadership** due to the fact that the two main Ministries involved in R&D and Innovation, the Ministry of Higher Education and Scientific Research (MESRS) and the Ministry of Industry tend to focus more on the programming function of the research system at the expense of the strategic function. Also, the advisory and coordinating bodies that support orientation and programming functions such as the National Advisory Council for Scientific Research and Technology (CCNRST), the Higher Council for Scientific Research and Technological Innovation,²² and the High Level Council for Science and Technology²³ are no longer active.

Besides the MESRS, the ministry of industry and other sectorial ministries (Health, Agriculture, Energy, etc.) do not benefit from a common strategic framework for R&D and innovation impulsed and monitored by the government, and they **lack formal coordination mechanisms**.

Similarly, main research programming agencies (ANPR, APII) do not fully play their role as contributors to the implementation of national research programs as many measures are implemented by other sectorial ministries. For example, the Ministry of Agriculture, Water Resources, and Fisheries have agencies for programming R&D activities under their umbrella. In addition, agencies such as the ANPR have **imprecise responsibilities** leaving the possibility for other institutions such as the MESRS to implement in its place a number of measures. APII plays a relatively minor role in promoting business innovation as it does not implement key financial measures in this area.

A step towards more focused and collaborative high-level decision-making on R&I policy was achieved in 2014 by establishing the **Research and Innovation Strategic Council** as a platform for inter-agency cooperation, chaired by the prime minister. Nevertheless, more clarity on the functional structure of the RDI governance system is necessary to increase its capacity, efficiency and transparency.

Organisations that carry out R&D are under the umbrella of different Ministries:

- higher education and scientific research institutions and research centres are partly under the umbrella of the MESRS and other sectorial ministries

²² Conseil supérieur de la recherche scientifique et de l'innovation technologique

²³ Conseil de haut niveau pour la science et la technologie

- industrial technical centres work under the umbrella of the Ministry of Industry
- technopoles and clusters work following orientations of both the MESRS and the Ministry of Industry

The PASRI report considered that as a result, the **lack of coordination** between the different ministries impacts the entire research and innovation system and collaborations between organisations that carry out research are insufficient.

Furthermore, the mission of the main organisations that carry out research should be better defined to allow them to contribute to Tunisia socio-economic development. Universities are currently focused on basic research, they should better integrate the issue of the use of research results and carry out further applied research.

The recommendations on the governance of the Tunisian R&D and innovation system developed in the PASRI diagnostic are presented in Figure 17.

Figure 17 Recommendations for the improvement of the governance of the R&I system

- II. Improve the organisation and governance of public research
 - II.1 Better define the missions of main public research performers
 - II.2. Allocate a higher number of A senior researchers in research centres
 - II.3. Improve the governance of public higher education and scientific research institutions, in particular universities
 - II.4. Review the status of certain public R&D human resources
 - II.5. Make a better use of heavy scientific equipment
 - II.6. Clarify the economic incentives of public research institutions to use diversified sources of funding
 - II.7. Clarify the process of recurrent funding and monitoring of research structures
 - II.8 Modify the status of the CNEARS and review its missions
- IV. Improve the effectiveness of the Institutional Governance of the National R&D and Innovation system
 - IV.1 Create a High Authority of Science, Technology, and Innovation
 - IV.2 Better define main national research and innovation orientations and priorities
 - IV.3 Improve vertical and horizontal coordination at ministry level
 - IV.4 Strengthen evaluation and monitoring activities

Source: PASRI diagnostic of the Tunisian R&D system, 2015

Following the PASRI analysis of the Tunisian R&I system the Tunisian authorities took several initiatives to overcome identified challenges and strengthen its research system, these include:

- The definition of strategic priorities for the research system
- The implementation of policy instruments supporting public-private collaboration
- The organisation of the "assises nationales des réformes de l'enseignement supérieur et de la recherche scientifique" on 4-7 décembre 2017
- The organisation of the "journées nationales de valorisation de la recherche" on 13-14 décembre 2017

After the research priority setting, the Ministry plans to adopt:

- Competitive funding for research based on scientific production,
- The establishment of a national body for scientific research

- The academic and scientific integration of research centres to universities for greater visibility at the international level (Ezzine, 2015)

4.3.2 Research-industry collaboration

The 2015 PASRI bibliometric study also pointed out that no evidence could be found of research-industry co-publications, suggesting a lack of research-industry collaboration in the country – and confirming the picture emerging from the data on GERD.

Furthermore, the Global Innovation Index 2017 ranks Tunisia 98th out of 127 countries, after Morocco (93rd) or Lebanon (48th) on the criterion of research-industry collaboration and assigns a low positioning to Tunisia also for the state of cluster development (97th out of 127 countries) (WIPO, 2017).

The PASRI diagnostic of the Tunisian R&D system highlighted that scientific collaborations between public universities and industry is practically non-existent, signalling a lack of knowledge transfer between the public research sector and the business sector. The report notes the inefficiency of interfacing structures between public research and the private sector and underlines the limits of the financial system offering poor funding opportunities for innovation (HASSAN, Diagnostic du système national de recherche et d'innovation en Tunisie, PASRI project 2015 , 2015).

A high number of support measures have been implemented in the last decade to tackle these gaps, yet many of them have been too scattered and small-scale to effectively address the challenge. To overcome these shortcomings, there is a need to provide sufficient incentives for private investment in R&D and help to restructure traditional sectors by supporting new innovative companies in their efforts to become mature innovators. Nevertheless, the SMEs' interest and engagement in innovation is not high, with an estimated 10% of the 4,500 enterprises interested in R&D outputs, according to interviewees. The textiles sector has been highlighted as more active in this sense, with 15-20 companies performing own R&D in this field, with ongoing direct collaborations with research centres in engineering and biotech.

Interviewees consider that barriers to R&I collaboration between the academic and private sector are found in the research sector and the gap between market and R&D, including the following issues:

- The researchers seem to lack incentives to undertake collaborations with industry, as this is not considered for their career advancement. Spin-off activity is very low. One of the explanations for this situation has been considered the fact that researchers find it very risky to step away from the research career, as combining spin-off activity and research is believed to be a conflict of interest. The researchers' and professors' status is closer to a public servant, with purely academic assessment criteria.
- Regulations also seem to have been a problem for the funding of collaborative research projects. The Ministry of Industry is said to be preparing a new law in this respect.

- Lack of training of researchers to match industry needs and style of working; for instance, graduates do not easily have access to the professors' labs for R&D projects
- Innovation financing is considered problematic, as in Tunisia the public sector and the banking sector do not offer funding tailored to the risk levels of private R&D and innovation project needs.
- There is a need for developing a culture for innovation and research-industry collaboration, which is considered to be lacking in Tunisia.

There are some good examples of university-industry collaboration in the ICT field, where student internships are used more frequently, and there have been cases of private sector involved in co-developing university curricula. Another example is the ESPRIT, a private technical university, which has a research division since 2010, with technological partnerships developed with the private sector. Moreover, ESPRIT has developed several types of partnerships with the private sector, including strategic, technological, training and research partnerships. Acting as a "support platform for industry", ESPRIT aims to guarantee that the skills their students obtain are in line with the market needs and targets the upskilling and re-training of the unemployed. The competences targeted by the university are defined by the Strategic Board, which is 50% made up by private sector members.

The PASRI diagnostic of the Tunisian R&D system developed a number of recommendations targeting the private sector (HASSAN, Diagnostic du système national de recherche et d'innovation en Tunisie, PASRI project 2015, 2015):

- to better design and implement direct public funding for private R&D and industrial innovation
- to improve the design and implementation of financial measures for enterprises
- to develop a better policy mix for private R&D and industrial innovation and put it at the heart of a "smart" industrial policy
- to enhance cross-sectoral collaboration, especially between public R&D performers and business

4.3.3 IPR system

The MESRS informed that currently, the IPR rights are held by the institutions where research outputs are produced. Royalties from IPR are received partly by individual researchers amounting to a share between 25/50%, depending on internal decisions within the individual research institutions. The ministry is investigating a change in the IPR law to facilitate higher shares of the royalties to be paid out to researchers themselves.

Discussions with stakeholders during the PSF field visit highlighted that IPR management is a weak point in the R&I system. To counteract this weakness, the MESRS five-year strategic plan 2017-2022 includes the establishment of an academy for the training of all research personnel in the areas of research project management, fund raising, financial management, intellectual property protection, management of innovation, communication, and ethics.

4.3.4 *Autonomy of the research institutions*

The legislative framework governing higher education and scientific research defined by Law No. 89/70 of 8 July 1989 was reformed with the promulgation of Law No. 2000-67 of 17 July 2000, and Law No. 2008-19 of 25 February 2008 on higher education.

The 2008 law introduced substantial changes to the governance modalities of public higher education and research institutions by granting them more autonomy - under certain conditions. In particular this regarded the possibility for universities and public research institutes to change their legal status from "public administrative institution" (EPA) to "public institution of scientific and technological nature" (EPST).

Next to the status of an EPA or EPST, public R&D performing institutions in Tunisia also can have the legal status of a "non-administrative public institution" (EPNA).

These legal statuses have important consequences for the institutions' level of autonomy in terms of financial management.

- In general, EPAs are the public institutions with the lowest degree of autonomy. Their budget is linked to the budget of the State and their financial organisation is governed by the binding rules of the Code of Public Accounting. These rules require in particular: i) the use of a very detailed budgetary nomenclature based on a classification of expenses according to their nature, administrative and functional criteria; ii) long accounting processes for expenditures that normally involve three independent actors under different authorities: authorizing officers, accountants, and expenditure controllers; and iii) the management of procurement contracts carried out by specific external commissions, often imposing long delays
- The EPST and EPNA, instead, have a financial organisation governed by the Commercial Code, which involves only a posteriori control of the central administration. Public procurement management is also internalised

Nevertheless, the insufficient degree of autonomy remains being perceived as a key problem by the university and research sector representatives interviewed. For instance,

- The need to obtain approval for financial investments from the MESRS (or often times the minister himself) implies a very lengthy process.
- Research labs and research units are financed by the ministry directly, based on a four-year planning of the funding (with financing provided on an annual basis). Due to this financial independence of the research labs, university management has no voice in the research strategies implemented in the institution, hampering the linking of research and education
- The recruitment of professors is managed centrally by MESRS (at national level). Nomination to a certain university is based on a scoring system that defines precedence on the choice among the preferences indicated by candidates, while the university is not involved in the decision-making process.
- The recruitment of researchers is difficult due to the fact that research labs need approval from the MESR. Representatives of a research lab interviewed mentioned that when needing to start a new research project in collaboration

with the private sector, due to the lab's difficulty in hiring the researcher, the only feasible recruitment solution found was for the researcher to be hired by the private enterprise.

- Research labs interviewed also mention difficulties with insufficient funding and research infrastructure.
- The evaluation of researchers is performed by the ministry, at the centralised level, based on research performance criteria (publications) and teaching criteria.

5 FUNDING FLOWS IN THE RESEARCH AND INNOVATION SYSTEM

The data provided so far by the MESR suggest a highly modest share of the overall national budget for Higher Education and Research dedicated to the steering of the research effort by means of specific research programmes or structures - see the budget cost item highlighted in orange in Table 14.

Highlighted in blue is the cost item for 'institutional funding', which is allocated to public research performers to ensure scientific activity. It allows for the financing of research and maintenance of scientific equipment (salaries are excluded) and are distributed directly by the Ministries.

In the sections below, we set out the (highly limited) information related to the research funding that we could collect through desk research and during the field visit. In Section 5.1

Table 14 Cost items in the national HE & research funding budget

Budget cost items	Share of national budget
Salaries	43.1%
Operations (including interventions and scholarships)	21.7%
Research programmes and structures	11%
Constructions	7%
Scientific infrastructure and equipment	8%
Others (evaluation, international scientific cooperation, studies, incubators etc)	9.2%
Total	100%

Source: MESR

5.1 Institutional versus competitive funding for research

The institutional funding for research is allocated predominantly by the MESR. Sectoral ministries (especially the Ministry of Health and Agriculture) provide small amounts of additional institutional funding according to their areas of responsibility.

The MESR currently allocates approximately 60% of its research budget as institutional funding for the research labs and research units, based on a five-year contract. This regular 'accreditation' process involves a peer review and an assessment based on about 20 performance indicators related to the scientific production, the openness of the structure to the external environment, and its human resources. It is currently unclear to what extent the level of the research labs' and research units' funding depends on their performance against these criteria. Nevertheless, this system is judged too complex given the limited resources allocated, in particular seeing the number and size of the research units and labs.

The Ministry of Health, instead, allocates R&D funding based on an ex-ante impact assessment and strategy (also called "Macro-level business plan"), also due to conditionalities by the World Health Organisation. The main objectives for

research in the health field include: quality of health services, training, employment, excellence in the public healthcare system. The strategic priorities lie at the basis for the funding of new research projects in research labs, which will be assessed against performance related to these priorities. A key focus is also on funding clinical trials, as there are four clinical research centres in Tunisia.

5.2 Project funding by the MESR

Project funding stands for competitive funding limited in time allocated to a research institution or a research team. Competitive funding by the MESR currently represents 40% of its R&D funding; the intention is to reverse the current ratio of institutional versus research funding.

In Tunisia national project funding is allocated through calls for proposals of the Federated Research Programs (PRF), the PEJC, i.e. the support programme for young researchers (bottom-up research funding), and the transfer of research results programme (VRR). Both programmes were initiated by the MESRS in 2002 and are managed by the MESR. Proposals are evaluated by the National Committee for the Evaluation of Scientific Research Activities (CNEARS).

The bulk of the national competitive research funding by the MESR goes to the **PEJC**. Researchers receive a bonus if active in the ten priority areas selected by MESR for competitive research funding; there is a 10-15% weighting of the scores for expertise in those areas.

Budget for the Federated research projects (FPR) is traditionally very low. In the period 2002-2014, only 22 projects were funded by the PRF for a total amount of 10,788 thousand DT (HASSAN, 2015).

The **bi- and multi-lateral research programmes** constitute the major source for the competitive funding of research.

Table 15 MESR competitive research funding budget for 2018

Abbreviation	Description	Budget 2018 (TND)
National programmes		804,000
FRP	Federated research projects	4,000
PEJC	Support Projects for Young Researchers	800,000
Multi/bi-lateral programmes		3,327,971
WJPA	Waterworks (Water JPI)	900,000
ERANETMED		1,106,771
PRIMA	Partnership for research and innovation in the mediterranean area	200,000
PHC-Utique	Tunisia-France bi-lateral programme	732,200
PICS	Tunisia-France bi-lateral programme	10,000
Joint International Lab	Tunisia-France bi-lateral programme	55,000
CMPTM	Tunisia-Morocco bi-lateral programme	175,000
PHC-Maghreb	Partenariat Hubert Curien France-Maghreb	149,000

Source: MESR

Projects funded by bi-/multi-lateral research programmes in previous years that are still ongoing are listed in Table 16.

Table 16 Ongoing projects funded in previous bi-/multi-lateral research programmes

Programme	Nr projects
ERANETMED	21
Tunisia-S.Korea Coop	4
Tunisia-India coop	19
ARIMNET - Coordination of agricultural research in the Mediterranean	5
PHC-Utique	66
PICS	1
Joint International Laboratory	2
CMPTM	25
GDRI - International research group	1
PHC-Maghreb	11

Source: MESR

New international collaborative projects are planned

- with South Africa (scaling up project for the commercialisation of research projects resulting from bilateral cooperation),
- Germany (« Tunger 2+2 » to finance Tunisian and German research structures and companies around innovative projects), and
- Europe (Twinning Project under the Support Program to the Association Agreement and Integration (P3AI))

Finally, there are a number of **other competitive research programmes** planned for which, however, the budget allocated in 2017/2018 is unknown to us. These programmes are part of the VRR programme.

Programme	Description
PAQ-Collabora	The PAQ-Collabora is a new programme supporting public private collaborative research projects with competitive funds through Technopoles, to support production of industrial prototypes or the development / improvement of production systems, processes, devices or products. The programme targets research structures, higher education and research institutions, technical centres, business incubators, start-ups and SMEs (public or private, Tunisian or foreign), associations that have links with technopoles. A call for proposals was published in October 2017 inviting these actors to build a consortium carrying a partnership project for the utilisation and exploitation of their research / innovation results. ²⁴

²⁴ http://collabora.dgvr.tn/uploads/collabora/PAQ_Collabora.pdf

Programme	Description
PAQ-Post PFE	The PAQ-Post PFE is a new programme funding the transfer of research results performed by public researcher, more specifically it supports production of industrial prototypes or the development / improvement of production systems, processes, devices or products. Through this programme, young graduates (2016 & 2017) of engineering courses and professional masters are invited with support from research structures and partner organisations to build a proposal for the utilisation of innovative end of studies project results. A first call for proposals was initiated in October 2017. ²⁵
National days for the transfer, utilisation and commercialisation of research results (JNVR 2017)	Organisation of the 2017 national days for the transfer, utilisation and commercialisation of research results (JNVR 2017) on 13 and 14 December 2017 including a competition, a conference and an innovation exhibition gathering 400 visitors on December 13 and 700 on December 14. Participants include: academics, technopole members, technical centres, business leaders, public and private companies, banks and other funders, and actors who support innovation. About 200 prototypes, innovation projects and start up were presented. The conference involved presentations from private companies investing in R&D (Médis, Sotulub, la Poste Tunisienne, Talan), directors of research centres (Centre de Biotechnologie de Sfax-CBS, Centre des Recherche des Technologies de l'eau de Borj cedria-CERTE, Institut Pasteur de Tunis, IRESA), representatives of the MESRS, technopoles, technical centres, and l'UTICA. Results of discussions were drafted as recommendations for policy makers. A competition open to researchers with innovative projects with high impact was organised and 54 projects were submitted, of which 17 were selected to take part in the competition and three awarded for the prizes of the JNVR 2017.
MOBIDOC	MOBIDOC is a mobility scheme for doctoral and post-doctoral students. Doctoral and post-doctoral students benefit from a financial allocation funded by the ANPR at 80% and the beneficiary company at 20%. Doctoral students benefit from an allocation of 1000 Tunisian Dinars per months for a maximum duration of 36 months. Post-doctoral students benefit from 1200 Tunisian Dinars per months for a maximum duration of 24 months. MOBIDOC was stopped in 2013 because no funds were available for the programme. It was relaunched in 2017 with European funding.

5.3 R&I funding by the Ministry of Industry

Despite the implementation of a number of public policies to support private investment in R&I in Tunisia since the beginning of the 1990s, the R&I system is still characterised by underinvestment of industry and insufficient involvement of businesses in the actual implementation of R&I.

5.3.1 Project funding

The Ministry of Industry funds the **PNRI** – the national program of research and innovation (Programme National de la Recherche et de l'Innovation). It is a

²⁵ http://postpfe.dgvr.tn/uploads/postpfe/PAQ_POST_PFE.pdf

programme that finances R&D, innovation projects, improvement of industrial capacities, and the modernisation of production processes, through the consolidation of the cooperation and the partnership between industrial companies, the research structures and the technical centers.²⁶ The projects need to be industry-led, with 20% co-funding by industry, while technical centres help in setting up the consortium. The maximum funding amount is 200,000 Dinars (€ 75,000).

5.3.2 Direct public support measures

Direct public support measures consist mainly of direct transfers of funds from public authorities to enterprises (public or private) through various mechanisms such as subsidies, conditional loans, reimbursable grants, or innovation vouchers. Until recently these measures were **the most used in Tunisia**, below main examples:²⁷

- PMN Programme de mise à niveau
- **PIRD - Grant for investment in research and innovation** (Prime d'investissement en recherché et innovation) : The PIRD was created in 1995 in the wake of legislation intended to support investment in activities such as R&D conducted by enterprises. It was the first research program dedicated to the needs of the enterprises. It provided a 50% grant of up to 20000 \$ towards a feasibility study as well as 750000 \$ towards the testing or adaptation of new technologies or the development and evaluation of prototypes. The PIRD includes now public and private enterprises as well as scientific associations, from all sectors including Health and Agriculture. The PIRD is part of the strategy of the State to raise the technological integration level of the economy.
- **ITP - Priority Technological Investment** (Investissement technologique prioritaire): In addition to the PMN Grant, ITP grant insures the financial support of intangible investments, the implementation of quality management system and also certification. Industries and services companies related to the industry which are running for at least one year and having no economic difficulties are eligible to this program. Since its launch, ITP approved 7951 requests for a total investment of 405 Million TND including 171 Million TND of Grants.

5.3.3 Indirect tax support measures

Indirect tax support measures imply a tax credit from the public authorities for business that invest in R&D. Although there are a wide variety of indirect tax measures, many of them are based on corporation tax. These consist of **corporate tax cuts** as a reward for R&D businesses.

²⁶ Mondher Khanfir (2015) How to harness the National Innovation System in Tunisia - To enable Technology Transfer and strengthen the Innovation capability, Final report, ESCWA Technology Centre

²⁷ Mondher Khanfir (2015) How to harness the National Innovation System in Tunisia - To enable Technology Transfer and strengthen the Innovation capability, Final report, ESCWA Technology Centre

Article 42 of Tunisian Investment Incentive Code (LOI DE L'INVESTISSEMENT, 2017) details the tax credits awarded to businesses investing in R&D (exemption from import customs duty, suspension of the value added tax and other taxes on imported material). However, while these measures exist in theory, **indirect tax measures have not been implemented in Tunisia to support R&D and industrial innovation.**

5.4 Public financial measures with a catalytic effect

These are actions taken by the public authorities to encourage the creation and development of enterprises with high growth potential, undertaking R&D and innovation activities. These measures support selected companies to access private capital which can be used to finance R&D and innovation activities.

Since the mid-1990s the Tunisian authorities have made increasing use of public financial measures with a catalytic effect. These measures include **risk capital measures, equity financing and guarantee operations:**

- Seed and start-up fund IKDAM I and II
- Joint venture capital mutual fund (In'Tech) aims to fund SMEs innovative projects or the creation of innovative start-ups. Funded projects have a value between 100,000 TDN and 5 million TDN. It is limited to 49% of share capital with a minimum ticket of 30,000TDN. In'Tech is managed by Sages Capital
- Seed and venture capital fund initiated by public companies
- Venture capital investment companies (SICAR) supporting the creation of SMEs
- RIICTIC Incentive Regime for Creativity and Innovation in the ICT Sector
- FODRODI Industrial Decentralization Promotion Fund (no longer active): reimbursable loan for a maximum amount of 1 million TDN for the creation or development of industrial SMEs. The investment could be reimbursed over a period of 12 years with a 5-year grace period. It was managed by Tunisian partner commercial banks
- Tunisian guarantee company (SOTUGAR)²⁸. SOTUGAR is a public company that reinforces the mechanisms in place for the development and promotion of SMEs during the most decisive phases of their life cycles (creation, extension, restructuring), it specialises in the management of guarantee systems.

The extent to which these measures are implemented and successful is currently unclear to us.

²⁸ Diagnostic du système national de recherche et d'innovation en Tunisie, Emmanuel HASSAN, PASRI project 2015, p184

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7 APPENDICES

7.1 Appendix A : Post-revolution governments in Tunisia

Tunisia's government was headed by **Hamadi Jebali** between 24 December 2011 and 13 March 2013

- Mohamed Lamine Chakhari (Ennahdha) Ministry of Industry
- Moncef Ben Salem (Ennahdha) Ministry of Higher Education and Scientific Research

Mehdi Jomaa headed the Government from 29 January 2014 to 6 February 2015

- Kamel Ben Naceur (Independent), Ministry of Industry, Energy and Mines
- Taoufik Jelassi (Independent) Ministry of Higher Education and Scientific Research and ICT

Habib Essid was head of the Tunisian government from 6 February 2015 to 27 August 2016

- Chiheb Bouden (Independent) Ministry of Higher Education and Scientific Research
- Zakaria Hamad (independent) Ministry of Industry, Energy and Mines

The government of **Youssef Chahed** is governing Tunisia since 27 August 2016

- Slim Khalbous (Independent) Ministry of Higher Education and Scientific Research
- Zied Ladhari (Ennahdha) Ministry of Industry and Trade

7.2 Appendix B : Technoparks and clusters in Tunisia

7.2.1 BiotechPole Sidi Thabet

Technopôle de Sidi Thabet « BiotechPole »: Biotechnologie appliquée à la santé et Industries Pharmaceutiques, région de Tunis

Site web: www.biotechpole.rnu.tn

Biotechnologie appliquée à la santé et Industries Pharmaceutiques et sciences du vivant.

Nature de la Structure	Nom de la structure
Enseignement Supérieur	<ul style="list-style-type: none"> Institut Supérieur de Biotechnologie de Sidi-Thabet Ecole Nationale de Médecine Vétérinaire
Recherche Scientifique	<ul style="list-style-type: none"> Institut National de Recherche et d'Analyse Physico-Chimique Centre National des Sciences et Technologies Nucléaires
Pépinière d'entreprises	<p>La pépinière qui a juste une année d'existence est très dynamique. Les start up qui sont actuellement dans la pépinière sont les suivantes :</p> <ul style="list-style-type: none"> VERA VIE, société de Fabrication de produits parapharmaceutique et cosmétique à base de plantes Unité pilote de Production de kits radio pharmaceutiques et services associés, relevant du CNSTN RBM Consulting, bureau d'Etude d'Ingénierie Pharmaceutique, Certification mise à niveau qualité, développement de nouveaux produits pharmaceutiques et parapharmaceutique et assistance marketing et export. NovAlix Pharma, société de prestation de R&D dans les technologies
Centre de ressources technologique	Etude effectuée , démarrage très prochainement du projet

Cluster Pharma IN (JORT n°146 du 07 Décembre 2017) est le nouveau cluster qui été monté à l'initiative du technopole.

7.2.2 Technopole Borj Cédria « Ecopark »: Energie renouvelable, Eau, Matériaux, Environnement et Biotechnologie

Site web : <http://www.ecopark.tn>

Nature de la Structure	Nom de la structure
Enseignement Supérieur	<ul style="list-style-type: none"> • Institut Supérieur des Sciences et Technologies de l'Environnement • Ecole Nationale des Sciences et des Technologies Avancées • Institut Supérieur des Technologies de l'Informatique et de Communication
Recherche Scientifique	<ul style="list-style-type: none"> • Centre de Recherche et des Technologies de l'Energie • Centre de Recherche et des Technologies de l' Eau • Centre National de Recherche en Sciences des Matériaux • Centre de Biotechnologie •
Pépinière d'entreprises	La pépinière contient des start up et des entreprises.

7.2.3 Pôle de Compétitivité Monastir/El Fejja Manouba « MFCPole » : Textile et Habillement

Site web: www.mfcpole.com.tn

Nature de la Structure	Nom de la structure
Enseignement Supérieur	<ul style="list-style-type: none"> • Ecole Nationale d'Ingénieurs de Monastir : département de génie textile – partenaire du technopôle • Institut Supérieur des Métiers de la Mode de Monastir : partenaire du technopôle • Institut Supérieur des Etudes Technologiques de Ksar Hellal : spécialisé dans le domaine du textile – partenaire du technopôle
Recherche Scientifique	Centre de Recherche en Sciences et Technologies du Textile
Pépinière d'entreprises	La pépinière contient des start up dans le domaine du textile intelligent
Centre de ressources technologique	Ce centre est construit et est en cours d'équipement. Il est rattaché au centre technique du textile.

7.2.4 Pôle de compétitivité de Bizerte : Industrie Agro-alimentaire

site web: www.pole-competitivite-bizerte.com.tn

Nature de la Structure	Nom de la structure
Enseignement Supérieur	<ul style="list-style-type: none"> Ecole Nationale d'Ingénieurs de Bizerte : en activité dans des locaux provisoires (en cours de construction des nouveaux locaux) Institut Supérieur des Etudes Technologiques Institut Supérieur de Commerce et de Comptabilité : en activité dans des locaux provisoires (en cours de construction des nouveaux locaux) Institut Préparatoire aux Etudes d'Ingénieurs de Bizerte : en activité dans des locaux provisoires (en cours des études)
Recherche Scientifique	
Pépinière d'entreprises	En cours de réalisation
Centre de ressources technologique	

Nombre d'entreprises installées	Domaine d'activité
BIC BIZERTE	<ul style="list-style-type: none"> INSTRUMENTS D'ECRITURES
<ul style="list-style-type: none"> SMC 	<ul style="list-style-type: none"> CONSTRUCTION MÉCANIQUE / CHAUDRONNERIE
<ul style="list-style-type: none"> BIZERTA AGRI INDUSTRY 	<ul style="list-style-type: none"> CONDITIONNEMENT HUILE D'OLIVE

Innovation/Projets réalisés
<ul style="list-style-type: none"> LACTIMED : Agro-clusters locaux pour des produits laitiers méditerranéens typiques et innovants Appui à l'exportation des huitres de Bizerte Via un cluster régional et emballage innovant Mise en place d'un label qualité des huitres et moules de Bizerte BIOVECQ « Biotechnologie marine vecteur d'innovation & qualité » Projet de Conception et industrialisation de produits nouveaux à base de blé dur à cuisson rapide

Cluster Huitres de Bizerte

Cluster Laitier Bovin de Bizerte

7.2.5 Pôle de compétitivité de Sousse : Mécanique, Electronique et Informatique

Site web : <http://www.pcs.tn>

Nature de la Structure	Nom de la structure
Enseignement Supérieur	Ecole National d'Ingénieurs de Sousse
Recherche Scientifique	Centre de Recherche en Microélectronique et Nanotechnologie
Pépinière d'entreprises	Très dynamique avec des success stories en matière de robotique et ICT
Centre de ressources technologique	EN cours de réalisation par la ministère de l'Industrie

7.2.6 Pôle El Ghazala des Technologies de la Communication

Sous la tutelle du Minsitère des TIC

Ecole d'ingénieur SUPCOM, ISET'Com

Site web: www.elgazalacom.nat.tn

7.2.7 Technopole de Sfax : TIC, Multimédia et e-health

Site web: www.sfax-icttechnopark.tn/

Nature de la Structure	Nom de la structure
Enseignement Supérieur	<ul style="list-style-type: none">• Institut Supérieur d'Informatique et de Multimédia• Institut Supérieur d'Electronique et des Technologies de Communication• Institut Supérieur de Gestion Industrielle
Recherche Scientifique	Centre de Recherche en Numériques de Sfax
Pépinière d'entreprises	En cours de redémarrage
Centre de ressources technologique	Construit en cours d'équipement

Nouvelle dynamique dans le domaine des technologies spatiales

7.2.8 Pôle de Compétitivité de Gafsa "PCG"

Web: www.polegafsa.com.tn

Ecole Nationale d'ingénieurs de Gafsa

7.2.9 Pôle Industriel et Technologique de Gabès (Pol.i.tech-Gabès)

Domaines d'Intervention Stratégiques : ECOTECHNOLOGIES (Eau, Chimie-Environnement et recyclage des déchets), Energies Renouvelables, Valorisation des ressources (Substances utiles, produits de l'Oasis et de Serres), Matériaux de construction & Eco matériaux, GEOTHERMIE appliquée à la serriculture & au

thermalisme, Promotion des Tics, services logistiques, produits de l'artisanat & l'Écotourisme.

Nombre d'entreprises installées	Domaine d'activité
07	Textile
09	Electronique, Industriel
03	Recyclage et environnement

7.2.10 Technopole de Médenine

Domaine d'intervention : valorisation des richesses du Sahara

Institut de Régions aride de Médenine, qui a la double tutelle du Ministère de l'Agriculture et de l'Enseignement Supérieur et de la recherche Scientifique

7.2.11 Pôle de Compétitivité de Gabes

Cluster « Primeurs du sud » (JORT n°: 107 du 06/09/2016).

Cluster dattes et palmiers(pole de Tozeur)

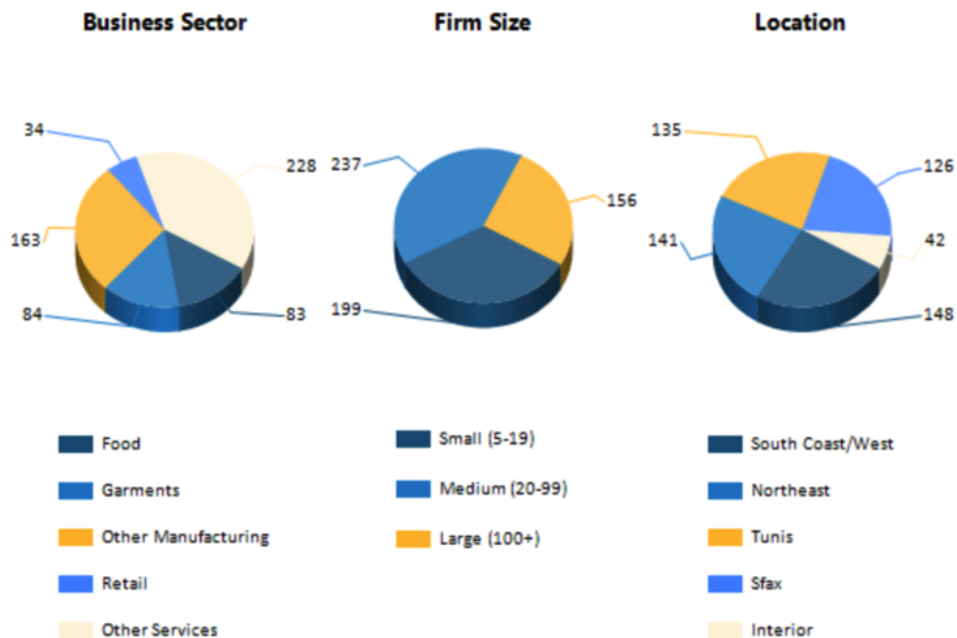
7.2.12 Pôle de Compétitivité de Jendouba

Spécialisé dans le secteur agricole et particulièrement les grandes cultures

7.3 Appendix C : Overview of sample from the Enterprise Surveys data for Tunisia, World bank 2013

Business owners and top managers in 592 firms were interviewed from September 2013 through November 2014.

Figure 18 Characteristics of firms surveyed



Source: World Bank Enterprise Surveys, Tunisia 2013

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This background report for the H2020 Specific Support to Tunisia focuses on describing the key characteristics of the research and innovation (R&I) system in Tunisia, its key actors and governance structure and policies.

It sets the R&I system within its political, social and economic context and provides key information on the public and private funding of R&D and the country's performance in both innovation and scientific research. It describes the research performers in Tunisia and their main characteristics and functions, the main actors in the Research and Innovation governance system, the research policies and priorities, and the key challenges emerging. A final chapter covers the public R&I funding system, both in terms of the institutional and competitive funding of research and R&D financing in the private sector.

Studies and reports

