# How public policy could enable Knowledge Based Economy in Africa: The Tunisian Healthcare case study.

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## Acronym

CHUs: Centre Hospitalier Universitaire
CNAM: Caisse nationale d'assurance-maladie, National Health Insurance Fund
GHO: Global Health Observatory
HC: Health Care
INS: Institut National des Statistiques, National Institute of Statistics
KBE: Knowledge Based Economy
KBI: Knowledge Based Industry
MENA: Middle East and North Africa
MoH: Ministry of Health
NIS: National Innovation System
STI: Science & Technology Innovation
WHO: World Health Organisation

## Abstract

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Thanks to its diversified resources and high growth potential, the African continent is called to address its huge development challenges by STI and to take advantage of the raise of the knowledge based Economy (KBE) to have a bigger weight in the global economy.
Tunisia appears as a "bridge head" for the shift towards a KBE, as its public policy were focusing since the independence on education and health. Which make the country in a good position to rely on strong fundamentals, to address the challenges of the KBE. The next step for Tunisia is to reinforce some specific value chains to valorize its capability to commercialize scientific research outcomes and to enter the battle field of innovation.

The healthcare sector is in a junction of numerous scientific domains and need to combine medical practices with new technologies and life sciences to solve health issues. It represents a global industry connecting many value chains, which make them a favorable ground for the generation of new types of high potential and fast growing businesses, supposed to drag out more job opportunities for young graduates. The country has already all the nucleus of a National Innovation System that produces a lot of research works in the medical sector. Even though it still requires better orientation and collaboration between its different components, it's showing up an interesting STI potential.

In this paper, we'll depict first the healthcare sector profile, as a KBE value chain, and we'll model the policy instruments in order to cross them with KBE pillars. This will show what had played a crucial role to boost Health Care performance.

Finally, We'll show that the Tunisian private Healthcare sector has been supported incidentally by a public policy that contributed to expand the outreach of the Tunisian know-how to African continent and how it's now playing a key role in accelerating the industrialization of the Healthcare value chain in emerging countries.

# SUMMARY

# 1 Introduction

A knowledge based economy (KBE) is the economy that uses knowledge and technology to develop and sustain its growth and productivity. It creates an environment suitable with industrial knowledge production and innovation. The Knowledge Economy Framework produced by the World Bank (WB) relies on four pillars. The first pillar is economic and institutional structures that are conducive to innovation and creation through enabling the utilization of resources in an optimal way. The second pillar is a well-educated and skilled labor force that is able to use knowledge efficiently. The third pillar is a technology infrastructure that simplifies the communication and the diffusion of information and diminishes the transaction costs. The fourth and final pillar is a solid innovation system composed by firms, universities, research centers, that enable technology transfer, adaptation and adoption.

Three main ingredients are required to perform a KBE: A mastered industrial value chain, an efficient national innovation system enabling technology transfer, and an appropriate funding system for innovation. The stake for emerging countries that are displaying a high population of graduates and youth, is to accompany the rise of knowledge based industry (KBI) which will come out with new high-performance workplaces and flexible enterprises that need new skilled jobs and services.

This progress can't be done without a clear and efficient standards and public policies, that's why it's very important for policymakers to have an understanding of the relevance, structure and characteristics of knowledge across industries.

# 2 The Tunisian Healthcare sector case study

Tunisia set the healthcare sector as a national priority since independence and has pledged to provide free health services for the low-income population. The country accounts for over 11 million people with 23% of its population under the age of 15 (INS, 2015). It has a life expectancy at birth of 73 years for men and over 77 years for women with an infant mortality rate per 1000 inhabitants of 8.2. In addition, the fertility rates have dropped from 5.2 children per woman in 1981 to 2.3 children by 2013, according to Global Health Observatory (GHO).

The country invests 6.2% of its total GDP in health; a rate higher than the minimum 5% threshold recommended by WHO and equivalent to that of upper middle-income countries. Health indicators according to GHO in 2015 are considered to be among the best in Africa and the MENA region. Over the last sixty decades, the country has made it possible to extend health coverage to all regions, eradicate several communicable diseases, improve life expectancy, reduce infant mortality, establish mandatory vaccination and improve medical coverage.

## 2.1 The Tunisian healthcare policy orientations

The Tunisian healthcare sector shows important assets:

- A public service with advanced medical capacity and a medical supply
- Developed and diversified private sector
- A competitive quality-cost ratio
- A reputable and effective health education system
- Complementary supports of attractiveness including tourism and accomomodation capacity with balneo and thalassotherapy services.

A national conference on health was organized in 2014. The conference adopted a participatory approach where professionals from the public and private sectors, union representatives, journalists, communicators, civil society and political parties exchanged ideas to respond to the sector needs.

The recommendations of the conference have been used to develop the following 5 axes that sustain the 2016-2020 national healthcare plan:

1. Prioritize the prevention and act on its determinants
2. Establish a territorial healthcare service through health clusters structured around a coherent health project
3. Invest in innovation
4. Set up a new governance structure for a better health policy,
5. Strengthen the public sector

## 2.2 Profiling the healthcare sector

Over 58,000 people work in the healthcare sector, of which 86% work for the public sector, according to MoH figures. In terms of doctors, 51% work for the public sector and 49% for the private sector. In 2011 and according to the MoH, Tunisia accounts for 13,686 physicians with a density of 1.3 per 1000 inhabitants (0.7 for general practitioners and 0.6 for medical specialists).
It has 3736 dentists with a density of 0.35 per 1000 inhabitants. 86% of them work in the private sector.

It has 2,404 pharmacists with a density of 0.22 per 1000 inhabitants also concentrated in a big part in the private sector. Their geographical distribution is fairly balanced due to the numerous rules imposed by the regulation. Tunisia has 41 863 paramedical staff with a density of 3,92 per 1000 inhabitants. Public hospitals are facing an increasing shortage of specialized doctors and paramedical staff due to the reluctance of professionals to work for the public sector, especially in remote areas.

The ratio of beds to 1000 inhabitants has stabilized at 2.2 in recent years for both public and private sectors. It looks satisfactory compared to that of other Maghreb countries like Algeria (1.7), Morocco (1.1) and Mauritania (0.4) in 2011 according to the WHO.

The Tunisian healthcare ecosystem is very dense, and it could be considered as a knowledge based industry which Tunisia has made it a specialty in recent years. From an economic perspective, it looks well developed and organized, with a high level of integration of many value chains, that are delivering complementary services.

## 2.3 The Tunisian Healthcare ecosystem

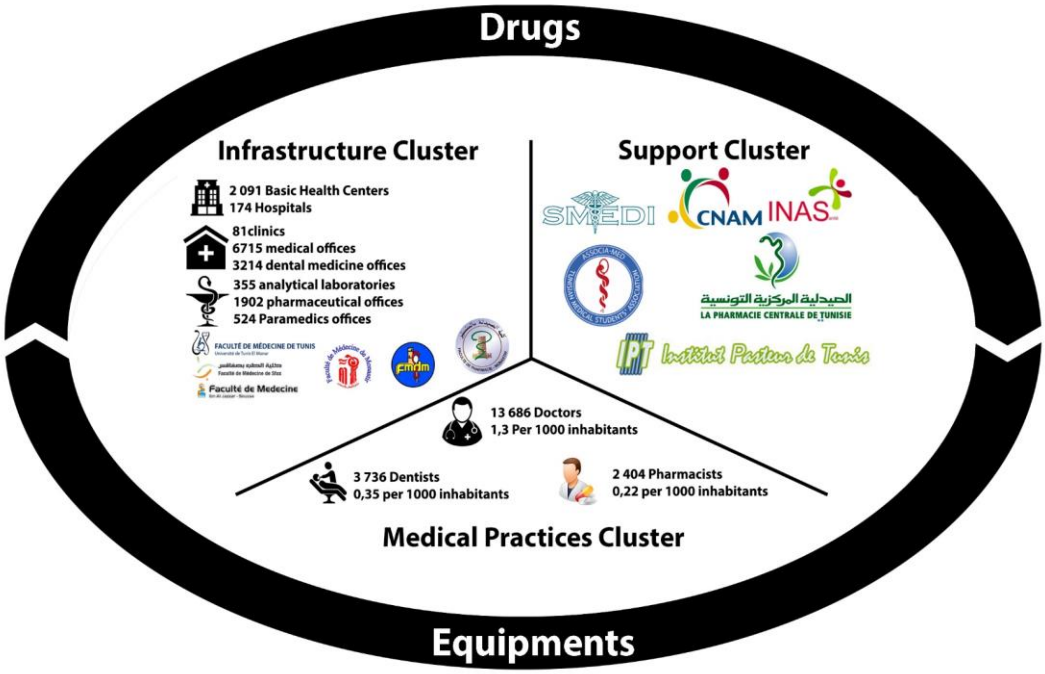
| Infrastructure | Medical practices | Support services |
|---|---|---|
| **Public**<br>• **2 091** basic health centers<br>• **174** Hospitals<br>**Private**<br>• **81** monodisciplinary or multidisciplinary clinics<br>• **6715** medical offices<br>• **3214** dental medicine offices<br>• **355** analytical laboratories<br>• **1902** pharmaceutical offices<br>• **524** Paramedics offices<br>**Education**<br>• **4** Medical Schools<br>• **1** Pharmacological faculty<br>• **1** Dental School<br>• **4** Higher Schools of Science and Technology of Health, reserved for the training of senior health technicians<br>• **5** Higher institutes of nursing<br>• **9** Establishments of professional training in the private sector Health, reserved for training paramedics with the same curriculum as public schools<br>• **15** Private schools for paramedical professional training, in sponsorship with the Ministry of Health. | **Access to medical practices**<br>• 13 686 Doctors with a density of 1,3 per 1000 inhabitants<br>• 3736 Dentists with a density of 0,35 per 1000 inhabitants<br>• 2 404 Pharmacists with a density of 0,22 per 1000 inhabitants<br>• 41 863 Paramedics with a density of 3, 92 per 1000 inhabitants.<br>➢ Medical and paramedical density of the Tunisian health system is around 5.8 workers per 1000 inhabitants and far exceeds the critical threshold set by WHO is 2.5 caregivers per 1 000 inhabitants.<br>**Ranking of exported medical practices**<br>1. Seaside tourism<br>2. Balneotherapy<br>3. Thalassotherapy<br>4. Preventive Cure<br>5. Fitness<br>6. Physiotherapy<br>7. Therapeutic Cure<br>8. Medical report<br>9. Cosmetics<br>10. Cosmetic Surgery<br>11. Dentistry<br>12. Other medical services. | • **National forum of Health Accreditation "Instance nationale d'accréditation de santé" (INAS)** : an independent public authority that contributes to the regulation of the healthcare system by quality<br>• **The Central Pharmacy of Tunisia "La pharmacie centrale de Tunisie" (PCT)** : centralized drug importation<br>• **The Tunis Pasteur Institute "L'Institut Pasteur de Tunis" (IPT)** : centralize the import of vaccines, serums, allergens and other biological products<br>• **Health associations:**<br>Conducting studies, surveys and organizing conferences.<br>• **The National Health Insurance Fund "La Caisse nationale d'assurance maladie" (CNAM) :**<br>Public Establishment of health insurance<br>• **International Medical Service "Service Médical International" (SMEDI) :**<br>an international society of medical services, specialized in supporting patients and providing logistical assistance benefits, administrative and medical in an international environment.<br>• **Conferences and Summits of the innovations of International Healthcare (SMIT,e-Health Research, amee…)**<br>Sharing of knowledge and innovation to ensure a global medical progress<br>• **Cooperation between countries:**<br>example:<br>Franco-Tunisian cooperation in the health sector (exchange of expertise) |

## 2.4 The Healthcare sector as a knowledge based industry

To better visualize the knowledge based industries supporting the "Healthcare value chain", we propose a systemic approach that models it as a holistic system with distinctive industrial clusters, we can group into 3 categories (see graph. 1), namely:

a) Cluster of « Infrastructure » services which are the services that provide a platform (physical or immaterial) for performing the healthcare activities or transactions within or between the different value chains.
b) Cluster of « Support » services which covers activities that allow oversight or quality assurance, compliance or security in the services delivery, in accordance with established standards and norms, or to enhance and boost the supply of provided healthcare services.
c) Cluster of « Medical practices » which focus on healthcare activities which are delivered by physician's staff to patients under a clearly identified protocol.

Technological and scientific capability deployed in the Tunisian Healthcare value chain is based primarily on the knowledge and expertise of the medical and para-medical bodies, and also on the availability of high-tech equipment required for cutting-edge clinics. The other services of the tryptic also need technology to operate effectively, particularly ICT to optimize the delivery of end-to-end quality services and ensure the competitiveness of the whole value chain.




*Graph. 1: Tunisian Healthcare value chain*

Today, the health sector in Tunisia has a huge potential of innovation, and could invest much more on technology in the periphery services around the core business, in order to attract more patients and create more value. This is in addition to the collateral effect on Pharma Value Chain and Tourism.

By another hand, developing new medical devices and active biomolecules as well as biomaterials for drug delivery is a big challenge that Tunisia could win. This is where the NIS is expected to play a key role in boosting or connecting some specific value chains where the ground is fertile, in order to enable technology transfer, with a focused strategy of knowledge valorization and commercialization that contributes to the foundation of an effective KBE.

### 2.5 The Tunisian Healthcare sector profile according to the KBE pillars

Tunisian Healthcare policy is clearly betting on Research and Innovation, but still averse to develop a strong public-private partnership. The government is promoting medical research and therapeutic innovation by public funding and will need the private sector resources to establish a reference in excellence services.

The R&D seems in symbiosis with the strategic orientation of the country. But still lagging in terms of translation into innovative processes, services and products.

At the meantime, the private sector seems to better take advantage from Biomedical research, as it's more closely linked to the pharma industry, which represent a big asset for the healthcare sector. In this direction, thanks to healthcare exportations, some Tunisian pharmaceutical companies have started in recent years to export their medicines in various countries in Africa.

This section will display the Tunisian healthcare characteristics in accordance with the KBE pillars enumerated by the World Bank.

- **Economic and institutional structures:**

The health sector in Tunisia is a dynamic and rapidly growing sector. During the 60's and the 70's, the country has opted for the construction of district hospitals and dispensaries mainly in the coastal regions and healthcare facilities in the underserved areas.
It is only in the early 80's that the government has allowed the authorization to build semi-private clinics, which resulted in the boom of the private sector.

- **Public sector:**

The public sector nowadays provides two thirds of consultations and 90% of hospital admissions (WHO country fiche 2016). It is the main provider of preventive and curative health care in the country. In 2011, this sector included 2,091 basic health centres and 174 hospitals. It has a capacity of 19 632 beds distributed throughout the territory with an average of 1.84 beds per 1000 inhabitants. It covers more than 84% of the total existing capacity divided between constituency hospitals (14.7%); regional hospitals (35.6%); CHUs and specialized centres (48.5%); to which health structures belonging to the Ministry of National Defense, and the Ministry of the Interior are added.

The public sector counts 3,658 beds and includes multidisciplinary or monodisciplinary clinics (81), general and specialized medical practices including radiology (6,715), dental surgeries (3,214), laboratories (355), pharmaceutical pharmacies (1902) and paramedical offices (524). The construction of private clinics should see an increase in the next decade, with 75 new clinics expected to be constructed by 2025 (Oxford business group, 2016).

A number of projects are being considered with regards to in the public sector infrastructure like the construction of new CHU in Sfax and Kairoun governorates and new hospitals in the Beja and the Gafsa governorates (Oxford Business group, 2016).

- **Private sector:**

The private sector is witnessing a spectacular development. The human resources (specialists) and financial resources are nowadays more oriented towards the private sector. This makes the public sector vulnerable to ensuring adequate availability of services, thereby causing an increasing inequality in access to quality health care between poor and rich classes.

Many private initiatives are under study, such as the $34m Tunis Mediterranean Hospital, which will be a modern hospital that uses a holistic approach to health care, digital records and high-tech equipment. A €25m cancer treatment and research centre in Gabes is also being planned under an EU-Tunisian partnership; however, the project has slowed due to disagreements with the MoH and bureaucratic obstacles[1].

- **Well-educated and skilled labor force**

The qualification of the Tunisian practitioners has nothing to envy to that of the advanced countries. Tunisia has invested heavily in training its human capital to satisfy health needs and was able to even attract foreign students mainly African ones thanks to bilateral cooperation between Tunisia and several African countries (mainly from Morocco, Mauritania, and Sub Saharan Africa).
As a matter of fact, the total number of graduates in 2013 is 6000, including 1,500 doctoral students in medicine, pharmacy and dentists.
Among the current 25,800 students, the number of foreigners is estimated at 645, of which 60% have North African nationalities and the rest of Francophone African countries (ADB, 2014).

Paramedics and professionals trainings are in line with European standards. As a matter of fact, since 2005, the training of nurses has become academic and oriented towards the equivalence of diplomas with Europe and France in particular. Moreover, several Tunisian specialists have the opportunity to complete their training in Europe with practical and long-term internships. They also have access to many forums and conferences held by international associations to deepen their understanding in specific fields.

Higher education in the field of health can be divided into two parts:

1- The training of doctors, dentists and pharmacists, which is carried out only in public institutions of higher education.
2- The training of paramedics, which is carried out both in the public and in private institutions.

The Tunisian training system for health professionals is particularly comprehensive. It is composed of:

- 4 Faculties of Medicine;
- 1 Faculty of Pharmacy;
- 1 Faculty of Dentistry;
- 4 Higher Schools of Science and Health Technology, reserved for the training of senior health technicians (17 sections including midwives, physiotherapists, hygienists, laboratory technicians, anesthetists...)
- 5 Higher Institutes of Nursing;
- 9 Private sector health vocational training establishments for the training of paramedical personnel with the same program as public establishments;
- 15 Private vocational training schools for paramedics and continuing education, in sponsorship with the Ministry of Health.

[1] Oxford Business Group, 2016

- **Communication and the diffusion of information**

A recent study (AFD 2015) [2] showed that the MoH Computer Centre has developed several applications to allow a better communication and diffusion of information. These applications cover a number of aspects such as health and hospital information systems, medical records, and platforms for technical tools and management of medical systems.

The Centre has been able to connect 280 public structures in the country: 28 regional hospitals, 109 regional hospitals, and 23 university hospitals.
Tunisia wants to take advantage of the Internet coverage and implement a so called "national network of health". The objective of this project is to connect all the health structures through a broadband network. This project is going to be implemented by a large network operator: Tunisie Telecom. The tools developed so far by the Centre were mainly focused on hospitals management activities. Training services are offered by the centre hospitals-based focal points, health professionals to insure a better use of these applications.

Moreover, some pilot initiatives are successfully being implemented. The centre has set up In the Habib Thameur hospital for instance a Nominative Medicines Computerized Daily Distribution project, which resulted in, reducing the cost of drug supply by 22%. The Tunisian authorities want to replicate this project in other public health facilities.

The private sector on another hand has also developed an information system that is even more efficient than the public one. Private initiatives have led to the development of electronic data exchanges between doctors, clinics and medical imaging centres. Doctors can nowadays monitor their patients in real time, have access to their results and prescribe appropriate treatments. The dynamic private sector environment is an incentive for to boost the public sector. Some private initiatives have somewhat outstripped the legal framework, particularly with regard to data protection. It is for this reason that a consultation group with the private sector in partnership with the union of ICT employers (Infotica), has been set up in order to insure an exchange of expertise, ideas and new insights.

As next step to insure the development of e-health will be through the launch of two major projects: The first project consists in the development of the single social identifier, currently being developed by the Centre for Economic and Social Research

The second project is the deployment of an electronic card system by the CNAM. This project would have a very positive impact on the financing of the health system, allowing a real-time fight against fraud and hence a better governance. Its implementation will also facilitate and speed up the process of setting up medical files and, electronic prescribing.

- **Solid innovation system**

In Tunisia, STI are recognized to be a major concern for public policies. The country simply ranks 49th worldwide in terms of medical publications, and its clinical research also enjoys an excellent reputation internationally.

This is not fortuity. Tunisia has invested in teaching hospitals (centre hospitalier universitaire or CHUs) and specialized centres. It has also developed some advanced medical services, such as the National Centre for Bone Marrow Transplantation, the Centre for Emergency Medicine,

[2] Source: http://www.afd.fr/home/projets_afd/sante-health/projets-sante/la-sante-numerique-est-elle-la-solution/l-e-sante-en-tunisie

Traumatology, and the Department of Thoracic Surgery, Cardiovascular surgery, neonatology Surgery, carcinology, hereditary and genetic diseases that are located in Tunis and several other cities.

The country is the leader of the Middle East-North Africa region (Mena) for the number of open sites and its participation in international clinical studies. It ranks just behind Singapore and Indonesia worldwide at the 60th position. Furthermore, Tunisia ranks at the 49th position worldwide in terms of medical publications in 2015[3].

Tunisian clinical research also enjoys an excellent reputation internationally. On the African scale, Tunisia occupies the second position in the field of health tourism after South Africa. On a global scale, Tunisia is ranked 2nd in thalassotherapy after France (ADB, 2009).

Tunisia launched in November 2002, Sidi Thabet Technopark, dedicated to Biotechnology applied to Health and Pharmaceutical Industries. This technopark is part of a network of technoparks that Tunisia set up in order to boost its economic potentials in the field of the health.

The Tunisian pharmaceutical industry has seen an important development. It exports more 10% of its production and currently covers almost half of national needs in value (ADB, 2014).

In order to better organize the clinical research activity and give it a better organizational basis, an initiative has been undertaken in 2015 in collaboration between the Ministry of Health and the Ministry of Higher Education and Scientific Research. This collaboration has permitted the creation of Clinical Investigation Centres (CIC) implemented in some hospitals in the regions. In addition, four professional clinical research platforms are operational by 2016. Both the centres and the platform and funded by the Ministry of health up to 7.8 million TND between 2015 and 2018.

The Institut Pasteur de Tunis (IPT) is a public health organization and scientific research center. It also produces some vaccines and is considered as a leading innovative institution as it has an effective Tech Transfer Office (named C2VT2) that manages a PCT patents portfolio, filled with the support of the international network of the Institut Pasteur.

The Tech Transfer Office of IPT is named C2VT2 which is the acronym for “Cellule de Communication, de Veille et de Transfert de Technologies”. This means that the IPT Tech Transfer Office is dealing with communication and business & technology intelligence in addition to the Tech Transfer process itself. The staff is formed by three highly qualified people in Tunis, backed by a staff based in different branches of Institut Pasteur in the world, and in particular the Institut Pasteur office in Paris, who is partnering with IPT and providing support in the following areas:

- **Health sector exports:**

Exports of health services account for one-quarter of private sector activity in Tunisia and, and combined with related accommodation services accounts for almost 4% of the country's services exports and 32% of the tourism exportations in 20134.

Foreigners already account for a large proportion of private institutions’ clientele 376,000 in 2013. Over the last 10 years (2000-2013), the export turnover of private clinics has increased by + 21% per year.

[3] SJR: Scimago Journal and country rank

[4] Source: AFD study on the development of the Health Services export strategy in Tunisia, 2014

The amount of exports of health services in Tunisia is estimated to 490 million TND in 2013, of which 191 million TND for Private clinics. In the last 10 years, export revenues from health services have been Multiplied by 7. This has prompted clinics to further diversify their offerings to a wider range of medical services, including dentistry, optics, orthopaedics and cosmetic operations.

Libyan clientele is predominant among foreign patients. It represents 316,000 people, or 84% of foreign patients hence a high dependence with regards to the Libyan clientele.
Sub-Saharan Africa, including Mauritania: 23,400 people, or 6.3% of foreign patients
Algeria: 16,700 people, or 4.4% of foreign patients
Europe: 11,200 people, or 3% of foreign patients

## 3 The healthcare sector public policy analysis:

The performance of a KBI revolves around the collaboration and cooperation between different value chains, and depends on some drivers, in particular the ones promoted by the public policy, such us investment environment, intellectual property rights…. In the following, we propose a tool to understand the strength and weaksnesses points ot the Healthcare sector, which assess the public policy through its main instruments, as described in the table1 below:

| Policy Instruments | Description |
|---|---|
| Public ownership | Involvement of the Government in the formulation and implementation of the public policy.<br>Clear definition of the public service. |
| Fundings | Subsidies for Healthcare services and medicine reimbursement.<br>Fair taxation and insurance policy<br>Funding research improving the technical, economic and environmental performance of healthcare services. |
| Regulatory control | Medical standards for healthcare services and third party control on hospitals and clinics. |
| Public-Private Partnership | Full or partial ownership of hospitals and related healthcare facilities and medical services providers |
| Labor regulations | Standards such as certification, working conditions and compensation and benefits for professionals in the healthcare sector. |
| Safety and ethics | Operational standards for healthcare services and ethical rules and control on practitioners. Governance involving practitioners. |
| International cooperation and standardization | International acts and agreements. Membership in international health organization. |

*table 1: Public Policy instruments*

The Tunisia Healthcare shows that each instrument is merely well addressed by the public policy, and the evidences and facts are reported in the following table:

| Policy Instruments | Tunisian Healthcare features |
|---|---|
| Public ownership | In 2016 the MoS was allocated a budget of TD1.8bn (€825.5m), representing a 9% increase in comparison with the TD1.6bn (€733.8m) granted in 2015 (Oxford Business Group, 2016) |
| Fundings | Considerable progress in terms of universal health care coverage with the creation of the National Health Insurance Fund (Caisse Nationale d'Assurance Maladie, CNAM) in 2004. The CNAM covers workers from both the public and private sectors, as well as their families, through a system combining fixed fee and health vouchers. Non-insured households are covered under the National Assistance Programme for Families in Need of Free Medical Assistance, which is funded by the state and provides the 28-30% of the population that is uninsured with free, or nearly free, access to health care.<br>The health insurance scheme covers 68 per cent of the total population and finances 47.7 per cent of public health expenditure, or nearly 26.3 per cent of total health expenditure. Tunisia is thus the country of the Maghreb where the health insurance system is most widely extended. |
| Regulatory control | The government created the National Health Accreditation Authority (Instance Nationale d'Accréditation en Santé) in 2012. The INAS is tasked with promoting the quality and safety of health care services in compliance with the standards of the International Society for Quality in Healthcare.<br>The authority is also in charge of implementing regulations, criteria and procedures for professional practice, granting accreditation to health care institutions, assessing the economic impacts of health care and diagnostic services, and coordinating between national and international accreditation agencies |
| Public-Private Partnership | It's already the most successful public and private healthcare infrastructure in the region; But, there is a lack of a coordination and cooperation between public and private healthcare sectors. Many opportunities are raised by the digitalization, that require an updating of national regulations in the PPP area. |
| Labor regulations | Standards such as certification, vocational training conditions with a special status or compensation and benefits in the healthcare sector. |
| Safety and ethics | Operational standards for healthcare services and ethical rules and control on practitioners |
| International cooperation | Many UN organizations are present in Tunisia (UNICEF, UNDP, FAO, UNFPA, UNIDO, IOM, UNAIDS, UN Women, UNOPS, WFP, OHCHR, UNHCR, World Bank) and UNESCO is reopening. The 2015-2019 UN Framework for Development Assistance is structured around three strategic dimensions and eight expected outcomes. The Healthcare sector is included within the strategic dimension of "equitable social services". A joint program (WHO, |

| | |
|---|---|
| | UNICEF, UNFPA) is in place to accelerate the reduction of maternal and neonatal mortality. A plan and roadmap for supporting the implementation of SDGs in Tunisia is being prepared between UN agencies.<br>The other multi- and bi-lateral partners include: the EU and the French, Italian and Spanish international cooperation agencies. There is renewed interest in investing in the health sector. |

*table 2: Tunisian Healthcare features*

## 4 Prospective on the Tunisian healthcare sector:

By crossing the public policy instruments with the KBE pillars in the Tunisian context, it is possible to highlight the favorable intersections that have benefited the health sector, in particular those that have led to its production The conditions conducive to the emergence of a high-performance, medical knowledge-based industry.

| Policy Instruments | Healthcare governance and institutional structures | Healthcare education system and professional bodies | Healthcare Communication and information system | Healthcare R&D and innovation system |
|---|---|---|---|---|
| Public ownership | *** | *** | *** | *** |
| Fundings | *** | *** | *** | *** |
| Regulatory control | *** | *** | *** | |
| PPP | *** | *** | | |
| Labor regulations | *** | *** | | |
| Safety and ethics | *** | *** | *** | *** |
| International cooperation | *** | *** | *** | *** |

*table 3 intersection KBE pillars and Policy Instruments*

The table 3 brings out a simple way that the Tunisian Healthcare benefits from a good Governance and Education system, that enabled such sectorial performance. In a second plan, the communication and information system, along with the R & D and innovation system are called upon to play a more important role to accompany the Tunisian Healthcare sector in its development.

## 5 Conclusion

Thanks to the Health sector, Tunisia can promote the emergence of a new, more competitive economy that generates more jobs for young graduates, and develop the competitiveness of value chains related to the healthcare industry, including the Pharma Value Chain, or medical equipment and devices.

By leveraging its innovation capacity, Tunisia could aspire to become a regional and continental leader in Healthcare, by mastering the whole value chain, from the R&D to infrastructure services or support services, such as transportation, tourism and insurance.
From another hand, supporting the proliferation of technology start-ups, particularly in the e-Heatlh domain, will bring an additional boost to the KBE.

Despite the fact that the Tunisian private Healthcare sector has been supported incidentally by a public policy, it largely contributed to expand the outreach of the Tunisian know-how in the region. The private sector is now playing a key role in accelerating the industrialization of the Healthcare value chain.

Definitively, Tunisia's healthcare system can rely on a solid foundation to become a world reference in the field of human progress and well-being, and a showcase of the medical knowledge state-of-the-art.

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