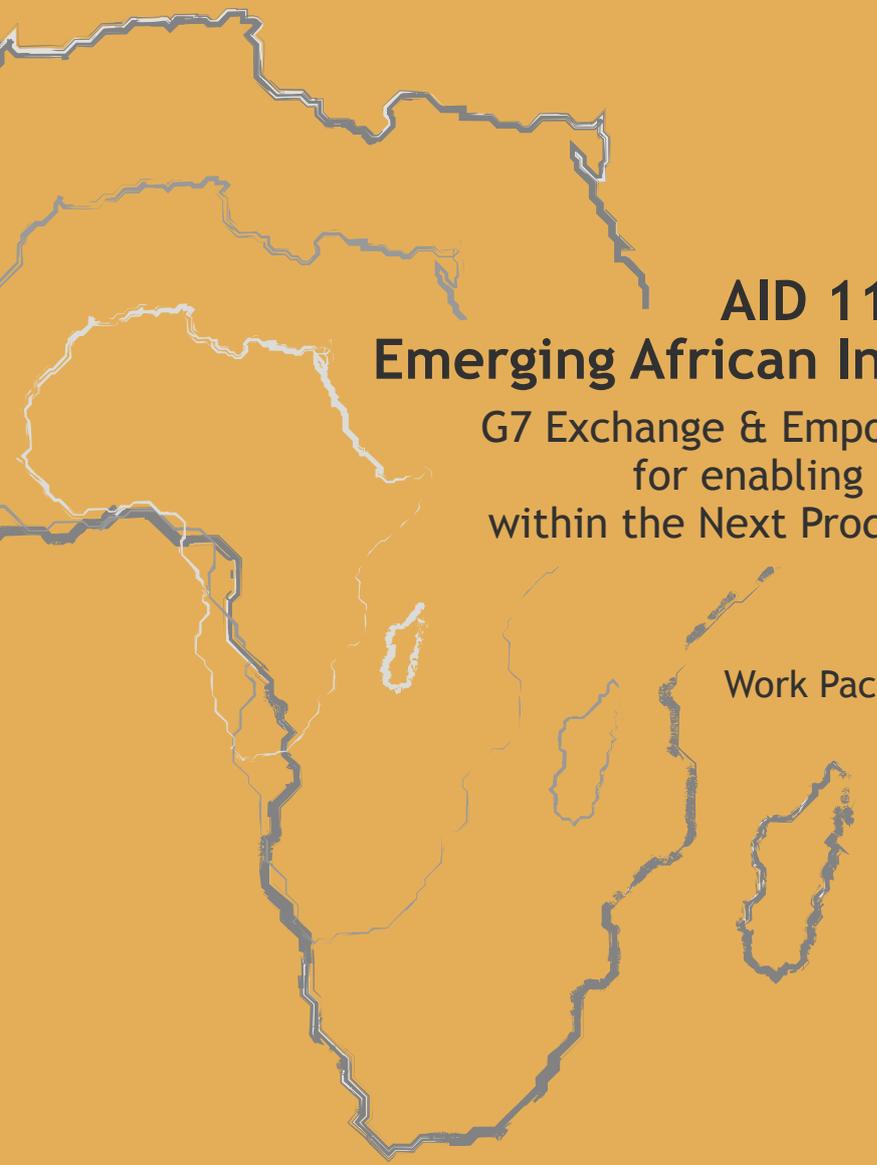


COUNTRY OVERVIEW NIGER

An Introduction to the Country Economy
and the National Innovation System



AID 11346
Emerging African Innovation Leaders

G7 Exchange & Empowerment Program
for enabling Innovation
within the Next Production Revolution

Work Package 1

COUNTRY OVERVIEW: NIGER

An Introduction to the Country Economy and the National Innovation System

This report describes Niger's National Innovation System (NIS) under the lens of the Next Production Revolution (NPR). After summarizing the main characteristics of the country's economy, it introduces the NIS players and institutions that are considered to sustain the diffusion of NPR technologies and business models across the main domestic industries. The report is primarily aimed at introducing all the members of the Emerging African Innovation Leaders project, including trainers and mentors, to the country's economy, its potential for the NPR technologies and the NIS components that can foster the embracement of the NPR in Niger. The report content may also be of interest to local and international policymakers, enterprises and civil sector organizations that are working toward the NPR adoption in the country.

The document was produced by Leonardo Rosciarelli between April and August 2018 as a researcher of Politecnico di Torino and the Energy Center Initiative. The report is part of a serie of six Country Overviews, which were designed and reviewed by the "Emerging African Innovation Leaders" research team composed by Pierluigi Leone and Leonardo Rosciarelli from Politecnico di Torino, and Emanuela Colombo, Paola Garrone, Andrea Gumina, Fabio Lamperti, Boris Mrkajic, Felipe Repetto, Nicolo' Stevanato and Stefano Pistolese from Politecnico di Milano.

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Executive Summary

This report aims at describing and analysing the National Innovation System (NIS) of Niger, inspecting the topic, the key institutions and the specific actors under the lens of the Next Production Revolution (NPR).

The first Section of the report describes the country focusing on several important aspects (e.g. geography, politics, economy, industry structure, etc.) with the aim of providing an insight of the local situation and to critically understand the starting point for the spreading of the NPR. Specifically, Niger is one of the sahelo-saharan countries and it presents quite good promising features for future development. Its strategical position makes it an irreplaceable crossroads to connect the southern african nations with the north of the continent and especially with the European markets.

Moreover, its abundance of natural resources, both of minerals and of energy materials, and its large availability of uncultivated lands make it particularly prearranged for future expansion. It presents few disparities in terms of living standard if considering the kind of settlement: while urban population starts to experience an increasing number of services, the great amount of rural population still relies on basic survival methods like fishery or self-agriculture. In addition, still

a great amount of people live in extreme poverty and this fact affects mostly its current ranking in international standards and statistics. Recently, in Niger there were some experiences of international collaborations that brought foreign investments from France and China. However, real industrial conglomerates have yet to come and much of today's production is obtained with knowledge coming from foreign countries. The low performance of Niger is also caused by a series of circumstances and the fundamental lack of basic infrastructure for the mobility, transmission and distribution of utility services such as digital or energy ones.

The second section provides a synthetic but insightful picture of the country's National Innovation System and critically analyses the major categories of actors. Although some actions have been launched in the last ten years in terms of capacity building and improving the conditions of civil society, the biggest steps are still to be taken. One of these is the reduction of the amount of informal markets and the promotion of constructive investments on the territory. It is perhaps necessary to push investments towards the creation of new infrastructures and new services that can stimulate the creation of both industrial and

innovative clusters, being truly capable of overturning the current situation of the Nigerien economy. In fact, many of the business actions undertaken in the country seem to be the result of individualistic drives, with the absence of real coordination centres aimed at optimizing the innovation and constructive process. In fact, the promotion of investments is still at the beginning and there are areas of development especially in the urban areas surrounding the capital, where the major interconnections with the nearby French-speaking countries take place. Finally, despite the more education-oriented policy of the last few years, resources for higher or university education are lacking and the drop-out threshold for primary schools is still at the lowest in the world. As highlighted in the previous section, this may force the country to rely on external aid, thus exposing it to various factors of instability.

Finally, the third section has the aim of exploring key actors of the NIS, highlighting their degree and kind of involvement, actions and potential to foster the spreading of the NPR in Niger and then to summarize the main findings in terms of possible actions to be taken to improve the national ecosystem and promote a range of solutions to common problems. So, we highlighted two agencies, a university and a possible incubator

that could become favourable to this action purpose. Then, related to the second and final part, after a critical assessment, five key sectors have been identified and cross-analysed with the three NPR-enabling transformation fields of Energy, Mobility and Digitalization.

1.

Country overview

This first Section of the report presents a synthetic overview of the Nigerien framework in terms of socio-political and infrastructural aspects. This kind of analysis is necessary to proceed in further chapters to a critical assessment of the country innovation ecosystem and definition of its own peculiarities.

- season, no rainfall, mean temperature of 35° C,
- November-February: winter with minimum temperature of 10° C,
- March-May: hot season with maximum and minimum temperature of 45° C and 25° C respectively.

1.1 General description

Niger is a Sahelo-Saharan, landlocked, low-income country that had, based on official national statistics, approximately 17 million **inhabitants** in 2012 (20 millions estimated in 2017). Most of them are settled in rural communities (84%) and the approximate population density is 13,5 people per km². The most diffused **religion** is Sunni Islam (80%), followed by Christian and animist minorities.

Malaria is one of the main problems of the country (more than 3 million cases diagnosed in 2016) followed by malnutrition, which affects about 15% of the total population, while 30% of cases end up with serious consequences.

The **capital** of Niger is Niamey and it is located, as the main urban centres, in the southern area of the country.

The climate varies across the country but it is roughly divided into 4 bands:

- June-September: raining season, mean temperature of 33° C,
- October-mid November: humid

After the adoption of the constitution on the 25th of November 2010, Niger is under a multi-party-political system, with a **semi-presidential** republican regime. Indeed, the president is elected by universal suffrage and instructs the prime minister to form the government.

In 2017, after many years of undesired primacy for the lowest world **Human Development Index**, Niger registered feeble improvements that are still hindered by corruption and the increasing social inequality. At the same time, Niger has become the center of the renovated international commitment for the **Sahel region**, strategic for the control of many natural resources and geopolitics equilibria. Notably, Italy only recently decided to re-establish its diplomatic headquarters in Niamey, with a decision taken on October 2016. Beyond Italy, other countries showed interest for this region with France that plays the key role for its former colonial rule and the interest in uranium ore. France continues to import 30%

of its uranium requirements from this country. China, Sud Africa, India, United States, Canada and Germany are the other countries that have appeared in Niger in recent years.

1.2 Economy

Niger has experienced an increase in **wellbeing** in the last 10 years, as demonstrated by the rise of GDP, during which period the growth rate varied from peaks of +8 to +2% per year. In 2012, more than 7.7 million people were between 15 and 64 years old and almost 43% of them were inactive or not occupied as they were not looking for a job, fraction that counts many women left at home. When active labour force is taken into consideration the **unemployment rate** appears to be a relatively low 2.4%, compared to the world value that is around 5.5%. Approximately 4 out of 5 individuals work in the agricultural sector and only 9% in trade and vehicle repair that is the second most labour intensive sector.

In the last five years the Import/Export ratio, defined as the quantity of import goods the country purchases per unit of exported goods, nearly doubled: it increased from 1.38 in 2012 to over 2.8 in 2016. That rise was caused mainly by the dramatic export de-growth of 57% from 2013 to 2016.

In 2016 the total exported goods amounted to almost \$US 600 million, 48% of which went toward France, while 38% went toward West African countries, 7% to Switzerland and 5% to USA. Exports to Asian countries totally switched from China to Japan and other Asia countries (mainly Southeast Asia) in 2014-2015, but almost critically arrested in 2016.

Imports were valued at \$US 1.7 billion in 2016, and are quite more differentiated than exports, but France still holds a large market share of around 31%, followed by West-Africa and China with both 17%. USA and Japan respectively hold 6% and 4% of the imports to Niger, while the top ranked European G7 countries are Germany (3%) and Italy (1%).

Principal **export** products, that accounted for \$US 927 thousand in 2016, slowed down in the past years and uranium ores and concentrates that amounted to \$US 298,935 were the principal voice of trade, followed by petroleum oil and palm oil, respectively accounting for \$US 151,007 and \$US 129,758. Due to the governmental incentives to Nigerien aircraft companies, Aircraft parts represent the highest amount of industrial trade in the last 5 years

Total Population
20 Million

(2017 estimates)

84%

lives in rural settlements

Human
Development
Index

In 2017 after many years of undesired primacy for the **lowest world Human Development Index**

Unemployment
rate

2.4%

The unemployment rate appears to be a relatively low, compared to the **world value that is around 5.5%**.

Export \$US 600 million

The total exported goods in 2016 of which

48%

France

38%

West African countries

7%

Switzerland

5%

USA

Import \$US 1.7 billion

in 2016 and are quite more differentiated than exports

31%

France

17%

West-Africa and China

6%

USA

4%

Japan

EUROPEAN G7 COUNTRIES

3%

Germany

1%

Italy

with \$US 368,038, followed by milled rice (\$US 137,405), cement and medicaments. It is important to mention that ICT's imports and trade are increasing and Niger falls now in TOP 3 countries for absorption of communication infrastructures, as we will further analyse in next chapters.

Niger is also a member of **trade and economic unions**, among others:

- African Economic Community (AEC)
- Economic Community of West African States (ECOWAS)
- West African Economic and Monetary Union (UEMOA) – Achieved monetary union (CFA franc, ISO 4217 code: XOF) and central Bank of West African States (Dakar, Senegal)
- Community of Sahel-Saharan States (CEN-SAD)
- G5-Sahel

As far as **Foreign Direct Investments** (FDI) inflows are concerned, they increased after 2008 when China entered the market raising annual maximum in 2011 with more than \$US 1 billion. Indeed, since year 2000, there has been trace of many Chinese official development finance projects identified in the region, and when they finished in 2011, flows of FDI dropped down year by year. In 2016, they resulted equal to \$US 292 million. Historically the French **uranium-mining** company AREVA plays a

large role in Niger's economy as it runs several large uranium ores mines in northern Niger. **Gold mining** was also a source of FDI but it became less attractive after 2014 due to two main factors. On one side it was experienced a worldwide falling of gold prices that lasted for two years. On the other side, the Nigerien extractive industry came into conflict with the discovery of easily accessible gold deposits in the north of the country, which generated a gold rush and a subsequent formation of a big informal economy.

1.3 Industry structure

A rough snapshot of Niger economy represents the country as mainly agricultural, while the industry sector seems to be much less developed, since the primary sector weights for more than 45% of the national GDP. **Agricultural** key products are mainly cowpeas, cotton, peanuts, millet, sorghum, cassava (manioc), rice while farming involves cattle, sheep, goats, camels, donkeys, horses and poultry. Value added per worker in agriculture was around \$US 833 per worker in 2016, that is slightly below the Kenya's value of \$US 841. This value is significantly lower if compared to the major African economies (Nigeria and South Africa around \$US 9,000 per worker).

The Niger's industrial sectors, where around 12% of the labour force operates, is characterised

by a slightly better **productivity**, that is nowadays around \$US 2,400 per worker. These values are at peak in manufacturing sector with \$US 4,600 US per worker. Leading sectors in these terms in Niger appears to be for a long time the food and beverages industry production that see their percentage weight on the total manufacturing value added stable at 20%. **Chemical products** on the other hand show an increasing

Agriculture is the only increasing sector, while the other primary sectors like forestry, hunting and fishing are suffering a decline of around 5.6% yearly

penetration over the last decade, positioning themselves in leading position while becoming one of the most productive activity in the country.

It is estimated that the **informal market** has an impact of 60% on the GDP and it is estimated to grow in the coming years, even if not with the expected rates for neighbouring countries (e.g. Nigeria, Mali). However, it has a low impact on gross fixed capital formation that is around 10%,

which suggests that the major affluence of informal sector has to be on intermediate goods consumption and operative costs.

1.4 Natural resources

Key natural resources for the country are clearly **raw materials** like uranium and thorium ore in the north, as well as the gold, which is also relatively easily accessible. Despite that fact, the mining and quarrying sector is registering a strong decrease in the last four years diminishing of about 13.4% from 2012. In addition, refined petroleum represents an interesting source of income that accounts for 16% of total exports in 2016. Total oil reserves amounted to nearly 150 million of barrels as of 2017. **Agriculture** is the only increasing sector, while the other primary sectors like forestry, hunting and fishing are suffering a decline of around 5.6% yearly, and this is why Niger is suffering a decline in the forest area of around 30 percent year-on-year since 1990. There are also some active procurement plans to start fostering solar power exploitation that is abundant in the region, and in proportion more feasible than wind. Indeed wind speed at 50m is found to be 6.53 m/s, with an potential for **wind power** generation of 295 W/m²,

Mining and quarrying sector
-13.4%

Strong decrease in the last years (from 2012)

Refined petroleum

16%
of total exports in 2016

150
million of barrels
Total oil reserves of 2017

High unexploited solar potential

Yearly solar radiation spans from
2400-2800 kWh/m²
from southern to northern areas

Agriculture

The primary sector weights for more than

45%

of the national GDP

Value added

\$US 833

per worker

in agriculture in 2016

Agriculture is the only increasing sector, while the other primary sectors like **forestry, hunting and fishing** are suffering a decline of around 5.6% yearly.

Niger is suffering a decline in the forest area of around

30%

year-on-year since 1990

Industry

The Niger's industrial sectors, where around

12%

of the labour force operates, is characterised by a slightly better productivity, that is nowadays around

\$US 2,400

per worker

These values are at peak in **manufacturing sector** with

\$US 4,600

per worker

decreasing drastically with height and location. In Niamey it is found a global average wind speed of 3.42 m/s at 10 meters high, making the construction of energy production plants unworkable in the region. On the other hand, if we raise altitude and reach 100 meters, the national average grows to 7.72 m/s with peaks of even 8.5 m/s in the northern desert regions.

The global solar atlas gives values of global **solar** horizontal irradiation of 2,400-2,800 kWh/m² per year from north to south with potential generation from PVs equals to 1.9-1.7 MWh/MW_p per year, and these are likely to be very high values in Africa and especially in the world.

1.5 Smart and integrated infrastructure (Enabling quality infrastructures)

1.5.1 Energy

Niger is nowadays one of the less energivorous countries in the world. It presents a yearly per capita **energy consumption** equal to 0.15 tons of equivalent oil and **an electricity consumption** of 60 kWh. Despite this preface, in the last 10 years the country experienced an increasing trend in electricity access for urban areas, while overall effects contained due to rural areas slowing action, where most of the people lives. This resilience to national grid penetration turns today in roughly 3 million of household without

electricity, trend that is steadily increasing due to the rising birth rate. Data regarding **electrification rates** are increasing in availability during the recent years and provide a more realistic picture of the current situation. Today the national grid covers approximately the 28% of the national territory, but it is only serving the 11,6% of the total population. Therefore, in 2016 only 600 locations disposed of a connection with conventional

Niger is nowadays one of the less energivorous countries in the world. In the last 10 years the country experienced an increasing trend

energy supply through high voltage transmission lines, while approximately 331,000 localities have low voltage network connection.

The **electricity production** relies above all on fossil fuels, mainly diesel and other refined oil products, with conversion in traditional thermal power plants. In the Dosso region, there the plan of a construction of the first electrical dam in the country whose work

will end in 2020, with an installed capacity of 130 MW.

The energy ministry has also expressed its intention to build a 50 MW solar power plant in the Agadez region to meet the growing demand for energy and a 60 MW hybrid thermal/solar in the Zinder region. The total estimated cost of the operation is around \$US 350 million.

Indeed **energy infrastructures** like transmission lines and generating stations are mainly located in the south region that is urbanized, while very few transmission lines are located between the cities of Agadez and Arlit. Niger is now facing the challenge to increase the reliability of electricity supply. Today it suffers from numerous electricity outages, also reported by 78% of local firms, causing an annual loss of 5% in total sales. Moreover, some local private stakeholders are standing up to these new investment opportunities to enlarge the distribution lines. These investments could be an opportunity through which enhancing the local penetration of electrical appliances both for industrial and domestic applications.

Regarding the final uses of the **other energy carriers**, biofuels and wastes are the first consumption items of final energy expenditure in the country and are mainly used for residential purposes (e.g. kitchen, heating

where and when necessary). On the other hand, refined oil is mainly used for private transportation, industries and for the autonomous electricity production.

1.5.2 Mobility

Nowadays, Nigerien **road** transport system can rely on a total infrastructure of about 20,300 km, out of which only 4,700 km paved and mainly concentrated in urban city centres and their neighbourhoods. Recently, the road system started suffering for some kind of logistic difficulties, like the increased number of overweighted trucks and accident per kilometre of road. Governments pointed out to fulfil these emerging issues with the construction of new **railways** for the transport of goods and passengers. The Niger 2020 partnership, the so called "*Blueline project*", between public authorities and the French Vincent Bolloré Group aims at connecting Benin (Cotonou) to Ivory coast (Abijan) passing through the Niger capital: Niamey. The construction started in 2014 and nowadays the works are still on going. They now stopped in the Dosso region, 130 km far from the capital and there are still some unfinished stretches in Benin. They supposed to finish the entire project within 2020.

Despite this lack of existing physical infrastructure, as well as to-date investments in it, **Niger's strategy** is to focus on infrastructural projects related to

Road coverage

Nigeria road transport system can rely on a

total infrastructure
of about

20,300 km

out of which only

4,700 km

paved

and mainly concentrated in urban city centres and their neighbourhoods

Rail system

Construction of new railways for the transport of goods and passengers

Airports

The country can rely on

10

paved

20

unpaved airports

with a total transport volume of approximately

15,000

passenger per year

mostly coming from the bordering countries

Population with internet access
38%
 The total penetration rate
7 million people
 have access to internet

Internet mobile
 The Niger has one of the lowest mobile internet adoption rates in Africa, caused from **high costs of mobile broadband**
23%
 of average per capita income

Optic fibre installations
 that now runs for almost **4,000 km** on the **national territory** of which slightly less than **3,000 km** were realized in 2016

road and railways. The country is actually trying to attract foreign investments for the construction of transport infrastructure, with the goal of leveraging its strategic position in connecting sub-Saharan region with the Northern African countries. Finally, the country can rely on 10 paved and 20 unpaved **airports** with a total transport volume of approximately 15,000 passenger per year, mostly coming from the bordering countries. In the past years, companies operating at national airports suffered from the lack of availability of replacement parts on site.

1.5.3 Digitalization
 Twenty million people live in Niger today and millions still do not yet have real access to the potential offered by the network. Therefore, only around 7 million have **access to internet** and the total penetration rate that is currently registering is around 38%; notably, almost mobile devices provide all internet connections. These data bring Niger in the last positions regarding the digitalization aspects as it has one of the lowest mobile internet adoption rates in Africa, caused from high costs of mobile broadband that represent 23% of average per capita income (UNCTAD).

Here, there are five main

telecommunication operators with own licence and only two (Niger Télécoms S.A. and Orange Niger S.A.) have fixed line cables. CELTEL, on the other hand, holds the largest market share in mobile telephony equal to 55% of the total, making it the largest operator in the country. With respect to mobile broadband, all of them have 3G connection system with the exception of Niger Télécoms that owns GSM (2G) technology. Despite this premise, if we look backward, the digital sector recently made great progresses.

The government invested in optic fibre installations

Year after year, the number of contracts' registrations has grown faster than expected. Fixed and mobile markets have grown respectively of 111% and 171% when compared to 2009 and the government invested in **optic fibre** installations that now runs for almost 4,000 km on the national territory, of which slightly less than 3,000 km were realized in 2016. The two broadband internet providers also invested in the ICT infrastructure, trying to connect Niger to the neighbourhood countries with optic fibre cables, with a connection speed that goes from 2.5 to mostly 10 Gbps.

This increase in demand has significantly raised the demand for knowledge and ICT assets from abroad.

1.6 Human resources

NGOs, such as the Italian Red Cross, claim that the real need today for Niger is not so much security but rather a real development that cannot start without education. The lack of an adequate educational system in Niger is there for all to see: large

Large amounts of children drop their studies before the end of the compulsory period, which they fix up to 14 years old students

amounts of children drop their studies before the end of the **compulsory period**, which they fix up to 14 years old students. Indeed 30% of school age children are out of school and it is now mandatory for the government to significantly improve Niger Human Development Index (HDI), now ranking 189th in the world, HDI value of 0.354. To reach that target they will try to raise the scholarship threshold to 16 years old within 2024. By the way, for

unlocking the true potential of this kind of intervention is better to have in mind other measures. For example, one should even keep in mind that the Niger has one of the highest **pupils-teachers ratio** in primary education in the world that is between 35 and 40, fact that emphasize the needs to expand the teaching staff. But education in Niger is a struggling sector as the **government is spending** at the moment around 6% of GDP (UNESCO) while **literacy rates** still remain extremely low: around 24% for young people while for adults it remains equal to 15%.

1.7 Entrepreneurship

Moving to entrepreneurship attitude, Niger takes place below 100th position in most of the world rankings for present innovation and business performance. Nevertheless, this lack can become a future opportunity also looking at of some recent Nigerien government interventions, pushing the country up to the first position in Sub-Saharan countries in terms of **ease of starting** a new business. They made enforcing contracts easier by creating a specialized commercial court in Niamey and they adopted a new code of civil procedures. A first result achieved was therefore the streamlining of the necessary procedures to request any type of permit, whether it be for operation, construction or any

Human Development Index (HDI)

0.354

now ranking 189th in the world

Education in Niger

is a struggling sector as the government is spending at the moment around

6% of GDP

(UNESCO)

while literacy rates still remain extremely low: around

24%

for young people while for adults it remains equal to

15%

Entrepreneurship

Niger takes place below

100th position

in most

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for present innovation and business performance

other kind. Indeed, now in Niger permits allowance takes only three practices on average. After 2012 it offers VAT-inclusive **tax exemptions** depending on the size of the business. Additionally, potential tax exemptions include start-up costs, property, industrial and commercial profits, services and materials required for production and energy use. As we saw from the previous chapters, Niger is growing also in

The number of patent applications is rising. This trend is driven mainly by Nigerien people living abroad, who applied for 114 out of 121 total patents in 2016

term of population **productivity**. The remarking growth rate for GDP PPP/worker of almost 3% per year is driving up the charts to the Niger in global rankings and especially if we look at regional ones. Anyway, there is still a long way to go on many different fields. **Women participation** as an example is under the regional average, arising also from the female higher drop rates in education starting from 13 years.

1.8 Science, research and innovation

Scientific production in the country does not yet seem to take off significantly. This become particularly clear if one goes through various world rankings, as for example the Scimago one. Here Niger is ranked 31st in the Africa in 2016 and 141st worldwide as it produced a total of 158 citable documents in each field of science, of which 48 were about **agriculture** topics. This could be an interesting data since it probably shows an increasing of interest for this subject inside the country and potentially enhanced through Next Production technologies such as smart agriculture. However, with seven researchers per million inhabitants so much work has to be done in order to improve awareness on key national topics. For what concern the number of **patent applications**, their number is rising. This trend is drove mainly by Nigerien people living abroad, who applied for 114 out of 121 total patents in 2016 (WIPO).

2.

Institutions of the national innovation system

The following section will exhaustively introduce the most important actors which constitutes the Nigerien ecosystem. We will shortly present their features and main activities, exploring the public and private institutions that could lead to enable the Next Production Revolution.

2.1 Firms

After century beginning marked by severe stagnation, today the Nigerien business environment seems to be recovering, albeit slowly. The statistical survey carried out in 2017 by the World Bank highlights a very fragmented reality composed mainly of **SMEs** (more than 70% of registered actors in the country) in contrast with the informal sector. The great part of firms is of recent formation, with less than 15 years of operation, and 86% of them formally registered when they started operations in the country. In addition, most of local SMEs do not use any licensed technology produced abroad and additionally it seems they are the more reluctant agents to introduce a process of innovation in the country, exception made for some small emerging realities. Indeed, many start-ups recently born in exploiting the potential of **frugal innovation**, aiming to improve the living standards of subsistence farmers. In some other cases, other explores also **high-tech solutions** like drone scanning for preventing

theft and monitoring crops climate resiliency or micro-sensors for smart irrigation. Despite these first attempts, Niger feels the **lack of real centers of attraction and collaboration**, where the various actors of the entrepreneurship environment can start interacting together.

At least three out of five companies in the country need for a **loan**, rate that grows if only small

The Niger feels the lack of real centers of attraction and collaboration, where the various actors of the entrepreneurship environment can start interacting together

enterprises are concerned. From the questionnaire, However, there is no evidence of a low rate of acceptance of loans by banks, but rather it emerges that many of these companies do not rely on banks for funding.

On the other hand, in Niger there are also a number of **state-owned** and parastatal companies for the supply of primary services and some joint ventures for raw

materials extraction. Below we propose a list of the main state companies operating in different sectors, which are obviously small agencies compared to other international companies operating in the respective sector. Here we have:

- Air Niamey, State airline company
- Escadrille Nationale du Niger, State airline company
- Niger airlines, State airline company
- COMINAK, General mining Joint state uranium mining venture with Areva (France)
- NIGELEC, parastatal conventional electricity generation company;
- Société Nigerienne de Transports de Voyageurs, State-owned passenger transportation
- SOMAIR, General mining joint state uranium mining venture with Areva (France)
- SONIDEP, State oil and gas exploration & production company
- SONITEL now NIGER Télécom Telecommunications, Fixed line telecommunications carrier

2.2 Government

For what concerns the governmental environment, it has undergone profound upheaval in the last 20 years also because of frequent coups, the last of them happened in 2010. In parallel, there were numerous **initiatives** in collaboration with international agencies, with the aim to provide a profound knowledge transfer in the country.

In 2003 it was established the National Private Investors Council (CNIP), chaired by the Prime Minister, with President of “*Chambre de Commerce et d’Industrie du Niger*” CCAIAN (board of trade) and the Minister of Commerce as Vice Chairs, striving to enhance the private sector in the region. They expect to meet this challenge by establishing a dialogue between the public and private sector, not excluding partnerships as well.

An important **capacity building** project was the one in tight collaboration with the African Capacity Building Foundation called Analysis and Forward-Looking Development Unit (CAPEL). It started in 2002 and ended in 2013 and lasted for the following two years as a think-tank in the country and it supplied, with a total grant amount of \$US 3.1 billion, the know-how capacities to Niger governmental staff for formulation and management of policies and **development programs**. It is thanks to this kind of initiatives that in 2012 Niger proposed its first three-year Social and Economic Development Plan (PDES), revisited and updated in May 2017 for the yet to come five years. The total cost of the operation is estimated between \$US 20-25 billion over the entire period, provided largely by the government expenditure and the rest from **private investments**

African
Capacity Building
Foundation
\$US 3.1 billion

To develop know-how capacities for formulation and management of policies and development programs

\$US 20-25 billion

Estimated cost of future development programs in Niger

Governments
also putted
great efforts
in investment on
judicial systems
and transparency

for main infrastructural project. Their **mission** is oriented towards solving the millennium challenges, including the resolution of food scarcity and access to primary education, as well as reducing child mortality and enabling basic infrastructure access. The focus will be on large-scale irrigation infrastructure development and **community-based, climate-resilient agriculture**, while

promoting sustainable increases in agricultural productivity and sales. Governments also putted great efforts in investment on **judicial systems** and transparency. By the way the great part of the manufacturing company managers regard to the courts as unfair, partial and corrupt, so the reform of the judicial system is now under the study of a National Agency for Legal Assistance.

Relevant governmental entities:

- Presidency of Niger
www.presidence.ne
- Gateway to the Government
www.gouv.ne
- Unofficial Government Site
www.niger-gouv.org
- Ministry of Equipment
www.equipement.gouv.ne
- Ministry of Finance
www.finances.gouv.ne
- Ministry of Justice
www.justice.gouv.ne
- Ministry of National Education
www.men.ne Ministry of Public Service and Administrative Reform
www.mfpt.gouv.ne
- Ministry of Mines and Industry
www.mines.gouv.ne
- Administrative branches: National Agency of Civil Aviation
www.anacniger.org
- Regulatory Authority for Telecommunications and Post
www.armniger.org
- Public Procurement Regulatory Agency (ARMP)
www.arpmp-niger.org
- Economic, Social and Cultural Council
www.cesoc.ne
- National Council for the Environment for Sustainable Development (CNEDD)
www.cnedd.ne

- Higher Council of Communication of Niger
www.csc-niger.neHigh
- Commissariat for Informatics and New Technologies of Information and Communication
www.hcntic.ne
- Directorate General of Taxes
www.impots.gouv.ne
- National Institute of Statistics
www.stat-niger.org
- Chambers of Commerce
www.ccian.ne

2.3 Universities

The higher education system in Niger has a total of eleven institutions, 9 of which are public, and additionally some little vocational schools.

The most relevant **academic center** in Niger is the University Abdou Moumouni of Niamey (UAM) as it counts for the major number of enrolled student, approximately 17,000 in 2016. Founded in the early seventies, it is also the oldest university. Other public universities are of very recent formation, like the one in the bigger region capitals like Maradi, Tahoua or Zinder that operate since 2007. The whole higher education system is mainly organized on the Francophone model. In addition, all universities provide courses for three-year degree, but only few of them allows the students go beyond this level. The **disciplines** covered are among the most varied, the UAM provides mainly courses on **humanities**, like arts, social

sciences and business. On the other hand, three universities of Zinder, Tahoua and especially Maradi deal with the scientific subjects mostly as part of the Institut Universitaire de technologie (IUT). This is a common establishment in francophone countries and provides the equivalent of first order degree in **technical subjects**. Zinder owns the civil engineering and urban planning department, Tahoua the tourism and agriculture department while Maradi owns civil, electrical and mechanical engineering departments. Additionally they also have different departments for humanities.

2.4 Innovation and enterprise support institutions

The “*Agence Nationale de la Propriété Industrielle et de la Promotion de l’innovation*” (AN2PI) is placed under the supervision of the Ministry in charge of Industry.

University Abdou Moumouni

The most relevant academic center in Niger (UAM)

17,000

the major number of enrolled student, approximately in 2016

At the same time, it serves as a national relay to the African Intellectual Property Organization (OAPI), which is the joint office for 17 member countries, including Niger. It serves to implement state **policy on industrial property** and promotion of innovation and receives applications for property titles and to check their regularity before transmission to OAPI.

It is worth to mention that the University Dan Dicko Dankulodo de Marady is pointed by the WIPO as a reference in the country as Technology and Innovation Support Centers for the particular focus and projects of the university. In fact, the academic center in recent years has started, and it continues to promote a series of projects to improve the **agricultural value chain** through a crosscutting approach. In order to operationalize the research, the university has set up joint research units about agricultural sciences, mathematics, renewable engineering and a platform for technological innovation.

In December 2017, the Islamic Development Corporation (ICD), the branch of the Islamic Development Bank in charge of the private sector, has signed a € 9 million agreement with the Sahelo-Saharan Bank for Investment and Trade (BSIC) from Niger, to support SMEs in the country.

They also announced in January 2018 the launch of "Engage", a new platform that will be entirely

dedicated to the **promotion** of science, technology, and innovation, linking innovations to market opportunities and financing.

In conclusion, in June 2017 an article appeared on the national press agency regarding the opening of a new state agency to support **technological innovation**: the "Agence Nationale pour la Société de l'Information" (ANSI). Recently, it appeared necessary for the government to reshape the Office of the High Commissioner for Information Technology by giving it new objectives on perpetual evolving ICTs field. The ANP, who cited a statement from the Council of Ministers, explains that this agency aims to achieve the operational implementation of the national strategy of universal access to ICT. Moreover, the agency will support emerging program and projects of development of the ICT in the national territory. ANSI can be a new and interesting platform to seed NPR and in Niger.

2.5 Linkages between the institutions

Niger have some historically institutions, one example is the Nigerien Council of Public Transport Users, known as CNUT, a professional organization grouping importers and exporters of goods and in general users of international transport services. Its mission was to enable **firm-to-firm** dialogue to build bargaining

power in order to obtain sufficient and efficient transportation services at a reasonable cost. In between, it is devoted to research and implementation of all measures to improve the efficiency, the speed of public transport and to control the evolution of costs. After 2010, Niger began to equip itself with a set of tools for public participation and involvement, thus attempting to carry out a reconstruction process. In 2012, the new elected government

After 2010, Niger began to equip itself with a set of tools for public participation and involvement

created the House of Enterprise (Maison de l'Entreprise). This is a **governmental enterprises hub** with the scope to support SMEs and SMIs and improve the business climate. From a functional standpoint, the House now operates under the authority of the President of the Chamber of Commerce, Industry and Crafts of Niger (CCIAN). They hope to achieve their goals by offering some sort of support services such as a Center for Commercial Formalities and an Investment Promotion Center for project monitoring, as well as providing

tax, legal and economic advice. The national network of agriculture chambers in Niger is responsible to regulate bilateral relationships between **farmers and Ministry of agriculture**. Niger used to offer incentives that are dependent on the size of the investment by the farmers and the number of jobs that could create.

3.

Conclusions

Once we have gathered all the information from section 1 and after exploring the national structural composition in section 2, we can now give a few key actors that could facilitate a future development of the nation. Furthermore, we can bring to the attention of the reader the actions believed to be the most promising to be taken, in order to lever the choice on the learning needs necessary for the future AILs.

3.1 Key actors in the national innovation system

Here few key innovation actors that could play a significant role in shifting the above-mentioned national shift will be presented. By presenting this group, one could have the ability to solicit different levers, gaining the possibility to obtain focus-oriented results and catalyse sectors of interest within the national innovation environment.

3.1.1 National agency for industrial property and innovation promotion (AN2PI)

The industrial compartment could become one lever to develop Niger economy. Particular emphasis is placed by national entities on transformation and industrial valorisation of agro-pastoral products with high revenue potential. Many actions have been carried out at the institutional level to promote industrial development and

one brought to the creation of the AN2PI (*Agence Nationale de la Propriété Industrielle et de la Promotion de l'innovation*). On one side, the AN2PI implements state policy on industrial property and promotion of innovation while, on the other side it is in charge of receiving applications for property titles and checks for their regularity.

3.1.2 National agency for information society (ANSI)

Local authorities have resolutely engaged Niger on the road to digital revolution but the demand for ICT remains far from being acceptable thus offering many investment opportunities. The government launched the national agency for information society (*Agence Nationale pour la Société de l'information*) with the aim to achieve the operational implementation of the national strategies on information and communication technologies.

3.1.3 University Dan Dicko Dankoulodo of Maradi

As briefly anticipated from the analysis of the education system, the strengthening of human capital through the rehabilitation of universities and public schools has been in Niger plan since 2008. Among different actions, a first interuniversity program on technologies was created including older universities but also new-born ones. This is the case of the Uni-

versity Dan Dicko Dankoulodo of Maradi, a fast growing university that is specializing in science, technology, engineering and mathematical (STEM) subjects. It is also a referee for the World Intellectual Property Organization in the region together with AN2PI.

3.1.4 Niger SME incubator centre (CIPMEN)

Small and Medium Enterprises are expected to be the national backbone in future years. With the aim at supporting SME, the CIPMEN (“Centre Incubateur des PME au Niger”) born from a public private partnership between the chamber of commerce of Niger, the bank of Africa and some private notable companies in fields like communication, logistic or energy. Its goal is to promote and support the development of technology based start-ups. The hub is located in Niamey and hosts nowadays around 20 incubated firms and more than 60 pre-incubated start-ups. It offers services like human capital empowerment, marketing and communication strategies and accounting assistance. It is also planned to become 100% private owned in the future 3 years.

3.2 Challenging, opportunities and learning needs

Through the performed analysis, it emerges that Niger started enhancing its potentiality and it is only at the beginning of its journey.

The country also showed a series of promising features in terms of bureaucratic processes and governmental system, coupled with a relevant availability of strategic natural resources that could be determining for the nation improvement. The next five to ten years may become crucial as the country is facing its peculiar **renovation momentum**, which encompasses governmental programs for infrastructure, scholarship, public-private partnership and private initiatives. Being a landlocked country, Niger has to rely mainly on neighbouring countries to access world potentiality and connectivity, and then the geopolitical situation of the area could really affect this process. On the contrary, its strategic position could play a relevant role in the regional contest.

Nevertheless, indicators like wellbeing, human development index and others from relevant world rankings and outlook remain under the region average and struggle to raise.

Having said that, many will be future challenges for the country. Niger has to solve issues about **water scarcity** and **abate subsistence agriculture**. Especially, **agribusiness**, given its relevance for national economy (45% of GDP), may represent an important sector where to transfer NPR approaches that may increase **productivity** and meanwhile increasing **environmental resilience**

The next five to ten years may become crucial as the country is facing its peculiar renovation momentum, which encompasses governmental programs for infrastructure, scholarship, public-private partnership and private initiatives

including precision agriculture and bioeconomy approaches. However, enabling infrastructure for the NPR should be also provided with drastic enhancement of communication services to reduce as many as possible the **digital**

divide that still affect the country. Finally, investments on **mobility** and **energy** networks and logistic improvements may support and enhance services availability for citizen and local firms.

Leading Industries NPR Enabling Transformations	Crop and animal production, hunting and related service activities & Fishing and aquaculture (ISIC codes 01 to 03)	Manufacture of food products (ISIC code 10)	Construction of buildings & Civil engineering & Specialized construction activities (ISIC codes 41 to 43)
Energy	Enhanced performance of energy infrastructure could bring to an overall penetration of better technology for irrigation or river/water monitoring, increasing the overall soil productivity.	The construction of an extended infrastructure could provide more electricity availability and then push to an increased massive production.	Expand power grid coverage especially in rural areas could help to improve life quality with a rebound effect on the entire ecosystem.
Mobility	Enhanced mobility in the case of Niger agriculture could mean both better dispatching of products, but also greater availability of resources for cultivation and harvesting.	Perishability is a strong issue in arid countries and enhanced mobility could help overcome this problem.	Improvement of paved roads network could stimulate private-public investment & FDIs. Prioritisation of railway and highway system development.
Digitalization	Use of digital solution for land monitoring could smoothen the effects of severe drought and reduce the rate of thefts/criminal/gangs, also increasing population safety in the countryside.	Opportunities for enhanced logistic optimisation (e.g. flow management) to ensure better performance in delivering enhanced quality food.	Use of digital, high tech solution to plan and project resilient building and infrastructures. Use of massive data (e.g. for transport project definition) could improve significantly the quality/safety or comfort of the obtained system minimizing the cost to afford it.

A few examples of the NPR potential for leading industries.

Appendix A

Table A.1 presents an extended list of possible key actors and related contacts for Niger. Actors have been selected according to their relevance within the NIS, according to an interviewed local expert. Furthermore, each actor has been classified according to the specific type of institution and ownership (e.g. Government, University, Enterprise, etc./e.g. Private, Public, etc.).

Actor & website	Contact(s)	Type of institution & Ownership
National agency for industrial property and innovation promotion http://www.an2pi.org/page-d-exemple/	BP 11 700 Niamey Email: an2pi.oapi@gmail.com trapsidaomar@yahoo.fr	Industry and innovation promotion agency Government
National agency for information society http://www.ansi.ne/organisation.php	National Statistics Institute, Niamey, Niger Telephone: (+227) 20722464	ICT supporting institution Gouvernement
Niger SME incubator centre http://www.cipmen.org/	Croisement 3e Latérite et Niamey Nyala Niamey Email: contact@cipmen.com	Start-up incubator Public-Private partnership
Chamber of Commerce, Agriculture, Industry and Crafts of Niger www.ccian.ne	Telephone: (+227) 20 73 22 10	Supporting Institution Government
Government http://www.gouv.ne/	Centre de Coordination de la Communication Gouvernementale (C.C.C.G) BP 220 NIAMEY-NIGER Tél. : 73.77.04 BP : 73.89.36 Tél./Fax. : 73.77.03 Email : cccg-pm@intnet.ne	Government
University Dan Dicko Dankoulodo of Maradi http://www.univ-maradi.ne https://www.facebook.com/univmaradi/	Address Avenue Mohamed VI, Maradi 465 Telephone (+227) 204 101 32 Fax (+227) 204 101 33 E-mail ali.hamadou@univ-maradi.ne aliamadou@yahoo.fr	University Government
Abdou Moumouni University http://uam.refer.ne	Street:BP 10896 City:Niamey Post Code:10896 Telephone: +227(20) 73-27-13 Fax: +227(20) 73-38-62	University Government

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