

Performances, Policies, Challenges and Opportunities of the Tunisian Agriculture Sector from Natural Resources Management Perspective a SWOT Analysis

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Abstract: A comprehensive assessment of the Tunisian agricultural potential, production, natural resources management and policies has been presented using SWOT (strengths, weaknesses, opportunities and threats) analysis. Concerning the *strengths* of the agricultural sector in Tunisia, it is important to notice that the sustained growth of this sector over the last three decades can be considered as an important factor of agricultural development in the short and medium run. Moreover, the social role of the agricultural sector in rural development and income generation for the poorest population made it necessary to consider this sector from a social perspective in addition to the efficient economic perspective. Among the *weaknesses*, the paper indicates that they are related to the environmental degradation (land and water). In addition, the intensification rate in some irrigated areas is still below the targeted potentials. Local water users associations, even though spread all over the country and taking into change the management of most of the irrigated areas in Tunisia, are still facing a lot of social, financial and organizational difficulties. Despite these challenges, some *opportunities* seem to be in favor of the Tunisian agricultural sector. The policy makers in Tunisia are willing to modernize the sector with new educated and open minded farmer's generation in Tunisia with their willingness to adopt new technologies once efficiently targeted by the necessary extension services. Major remaining *threats* of the Tunisian agriculture are relative to the low consciousness level of private farmers about sustainability issues, climate change impact on rain fed agriculture and on the availability and use of water resources, fluctuation of the international food market prices and the increase of the energy prices. Moreover, the current weak political context after the 2011 revolution made it difficult to implement and to enforce various regulatory instruments especially for natural resources exploitation.

Key words: Agriculture sector • Water constraints • Economic growth • SWOT analysis

INTRODUCTION

Agriculture is contributing with an average of 11.5 % to the national GDP in Tunisia (average value of the period 2000-2009). In 2009, agricultural investments represent 10% of the total investments, all sectors included and 21% of the agricultural GDP [1]. Moreover, 57% of these investments are realized by private sector while 43% of them are public.

The agricultural sector employed 17.6% of the total active population in 2010. The agricultural and agro-food sector is also highly contributing to the international trade of Tunisia, with in average 9.5 % of the

total national exports (over the last 15 years) and 9.6 % of the total national importations (these percentages are calculated based on current prices). In 2010, agricultural exports contributed almost 11% to the total national export [2]; and the value of agricultural exportations represented around 26% of the total agricultural GDP. However, even though the total national export has rapidly progressed since 2006, the agricultural and agri-food exportations were relatively stationary and stable. This is mainly due to the structural characteristics of this primary sector and these reforms have had a significant effect, leaving room for further growth.

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Despite its advanced agricultural sector strategy, in Tunisia many challenges remain to pursue greater environmentally and socially sustainable development. The question is whether this process is socially and environmentally sustainable. The biggest constraint, among others, is represented by the water challenge: The country is facing the effects of climate change and the exponential depletion of water resources. The water used for agricultural purposes in Tunisia represents around 75% of total water usage. Irrigation has fostered agricultural production and this has helped boost cereal production to meet food security needs of the population. Despite this, yields are generally insufficient to meet domestic demand and over the past ten years the percentage of irrigated land over the total agricultural area has decreased.

It is within this framework, this paper provides a comprehensive assessment of the agricultural performances, challenges, opportunities and policies with special emphasis on the natural resources management using SWOT analysis of the sector with a summary of main strengths, weaknesses, opportunities and threats facing the Tunisian agriculture sector.

The identification of SWOT for Tunisia can be very important; as subsequent interventions can use the SWOT in the process of planning specific measures to developing the sector, while being socially and environmentally sustainable. This analysis can help decision makers, e.g. the Minister of Agriculture, to determine whether a particular objective to food security can be achieved, given the SWOT profile of the country and of the Ministry of Agriculture with regard to the natural resources limitations.

This paper is structured as follow. In the next section, a general mapping of the nexus between agricultural production, food security and water constraints is assessed. The agriculture performances and benefit measurements are described in section 3. In section 4, we present the SWOT analysis findings of the Tunisian agriculture sector. Finally, some concluding remarks with an emphasis on the principal policies implications are outlined.

Agricultural Production, Food Security and Water Constraints: Tunisian agricultural sector is facing increased water scarcity mainly due to the growing demand of irrigation water, competition of other economic sectors and the climate change. Tunisia is characterized by low rainfall and limited renewable water resources. It is influenced by the arid and semi-arid climate that covers more than 75% of its area. The agricultural sector is

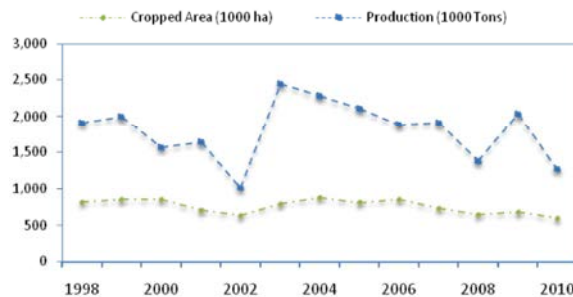


Fig. 1: Cereal production (1000 tons) and cropped areas (1000 ha) in Tunisia

Source: Own elaboration (2014)

highly dependent on water resources since it consumes more than 75% of total water use in the country [1]. Major crops, in terms of cultivated area, are tree crops (especially olives and dates) followed by cereals. While tree crops are strategic for exports (Tunisia is the fourth world exporter of olive oil), cereal crops are very important for human and livestock domestic consumption. Cereal and fodder cropped area and productions are highly dependent to the climate variability and importations are done almost each year to cover the gap between domestic production and consumption.

Tunisian agricultural production is highly dependent on climate variability. The annual crops areas, especially rainfall crops, are changing from one year to another. As an example of this fluctuation, total cereal production in 2002 was around 0.51 Million tons while in 1996 and 2003 it was around 2.9 Million tons (Figure1). The same figure is observed for all other cereal crops where the yields of durum wheat (between 0.5 and 2 tons/ha), soft wheat (between 0.5 and 2.5 tons/ha) and barley (between 0.4 and 1.5 tons/ha) are highly variable from one year to another.

Another major problem of the agricultural sector in Tunisia is the small farms' size. In fact, the average farm size in Tunisia in 2005 was about 10.2 ha [1]. Total farm number is 516 000 farms, managing an area of 5.3 million ha. In 2005, 54% of these farms have a size lower than 5 ha and 75% of farms have a size lower than 10 ha [1] indicating a main structural problem facing the modernization of the agricultural sector.

In terms of trade balance, the agriculture and agro-food trading recovery rate in Tunisia was in average 87% over the period 2000-2009. This rate was also highly fluctuating with minimum values of 48% (in 2002) and maximum values of 121% (in 2006) [3]. It is important to notice that positive and successive trading recovery rates were recorded for only three successive years [3] (Figure 2).

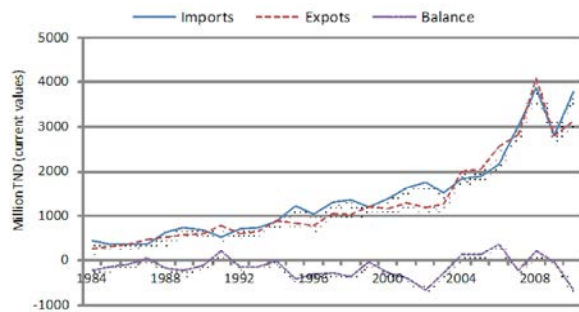


Fig. 2: Agricultural trading balance in Tunisia between 1984 and 2008

Source: Own elaboration (2014)

The stabilization of agricultural yields and the decrease of the sector dependency climate variations are necessary for food security and agricultural trade balance in Tunisia. Many solutions are proposed including the improvement of farmers' skills, financing, mechanization, intensification and the extension of the irrigated areas. The latter strategy can be considered as the most important in Tunisia in terms of mobilized resources in the last four decades.

Currently, irrigated area is covering around 450 000 ha [1], which is around 8 % of the total agricultural area. Irrigated areas in Tunisia are producing 35% of the agricultural output value, 20 % of total agricultural exports and 27 % of agricultural employment [4]. Around 48% of these irrigated areas are irrigated from groundwater sources, including both superficial and deep aquifers. However, water resources in Tunisia are scarce and should be, consequently, highly valued. Overall water resources in the country are estimated to be only around 4700 Mm³ [4] including 650 million m³ of non-renewable resources (13.8 % of the total water resources). Surface water is estimated to 2700 million m³.

Groundwater resources constitute 43 % of the total water potential. In 2008, groundwater use in Tunisia was estimated to be around 2000 million m³, confined within 212 shallow aquifers (containing 719 Million m³) and 267 deep aquifers [2]. Tunisia is expected to face deep water shortage in the near future where the overall water demand may exceed the available resources. For this reason, many efforts are mobilized in order to enhance the efficiency of water use in the agricultural sector and to improve the valorization of water resources used for irrigation. Rational use of irrigation water for the agricultural production is necessary for yields improvement and stabilization (food security) and also for water resources conservation and preservation.

Agriculture Performances and Benefit Measurements:

The contribution of agriculture in economic development depends on the macroeconomic environment (development level of the country) as well as on agricultural performance indicators.

Agricultural employment increased by 20% between 1993 and 2002. However, in the same period no increase in agricultural labor productivity was recorded [5]. In the periods of the IXth (1997-2001) and Xth (2002-2006) development plans in Tunisia, labor productivity in the agricultural sector was not changing while it was increasing with 4.4% and 4.7% per year, in the industrial and services sectors, respectively [6] (Figure 3).

Another abundant phenomenon (especially during the last decade) is that the agricultural labor market is at the lowest level of labor supply. Workers in rural areas prefer more competitive and remunerative sectors such as industry or services. With the call for more quality investments in the deep rural areas and for the diversification of public and private investments in these areas in Tunisia (which have mainly an agricultural vocation), many questions arise regarding the agricultural labor market and the employment opportunity of this sector. Moreover, agriculture is the sector which is consuming the most of water resources in the Tunisia. Water productivity and efficiency of water use in the agricultural sector are the lowest compared to the rest of sectors [7].

A comprehensive program from saving irrigation water began in 1995. Significant financial incentives have been offered to promote efficient irrigation equipments. The water subsidies can represent for small size farms, up to 60% of the facilities costs. Thus, the rate of irrigated area equipment using water saving systems was 80% in 2007 (25% with surface irrigation improvements, 27% with sprinklers and 28% with drip irrigation). Within ten years, this strategy allowed the stabilization of the water demand from irrigation, despite the expansion of the irrigated area at the national level; the irrigation sector represents 27% of agricultural employment. The production of irrigated areas is estimated at 35% of the total agricultural production (in value) and its participation in the export of agriculture products is around 20%.

There is no doubt that the irrigation sector is nowadays considered as strategic for the whole Tunisian economy. However, some main issues related to this sector remain unclear and without responses. The main persistent problems are:

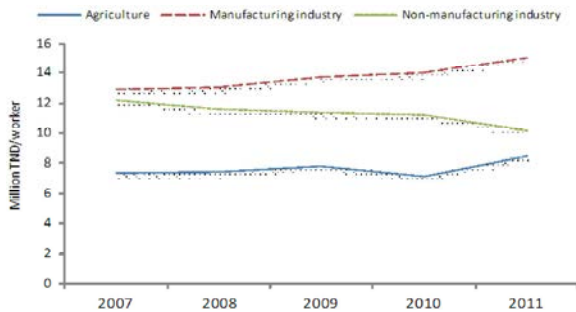


Fig. 3: Labor productivity in agricultural and industrial sectors
Source: Own elaboration (2014).

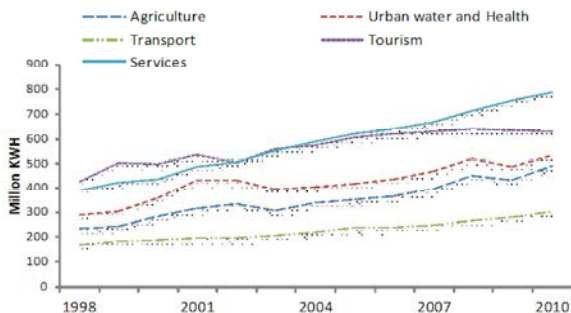


Fig. 4: Energy consumption of different economic sectors in Tunisia (in Million Kwh) [2]
Source: Own elaboration (2014).

- Currently, estimations of the contribution of this sector to the national economy are provided by the Ministry of Agriculture. Even at this central level, there is no consensus about the exact annual contribution of the irrigation sector. Thus, the need for a national accountability system of the irrigated sector value added is crucial.
- Public investments which are being done in the irrigation sector during the last decade are around 45% of total public agricultural investments. But, is it still socially profitable to invest in irrigation? What is the social investment return of these investments?
- Moreover, the irrigation water used in the irrigation sector is still heavily wasted. Another important question is then about the opportunity cost of using such a rare resource in the agricultural sector?

The APEWC-MENA project (Agricultural Productivity with Emphasis on Water Constraints in the Middle East and North African - MENA region), is trying to provide some responses to these questions based on the little information available about the historical

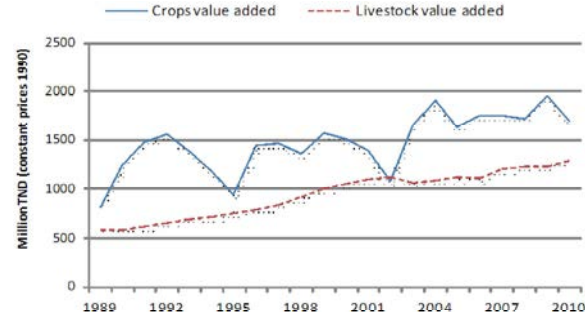


Fig. 5: Agricultural value added in Tunisia (constant prices 1990)
Source: Own elaboration (2014).

evolution of the agricultural and irrigation value added and investments in Tunisia (and some other MENA regions).

Irrigation-Energy nexus is also important issue of the Tunisian agriculture. Energy is not only an agricultural input, but also a very-specific irrigation input, especially for the case of groundwater resources and mechanization. Energy policies can then have important implications on the water sector (irrigation) performances. In Tunisia, 95% of irrigated areas are equipped with pumping systems and the total pumping capacity has been estimated at about 160,000kW in 2005 (Figure 4).

Policies Changes and Growth in Agriculture: Statistics show that the crops value added during the last two decades widely increased but also constantly fluctuated (Fig 5). An important remark is that the crops value added sustainably achieved the level of 1500 Million TND since 2001. It is also remarkable that since them, this value added becomes less variable from one year to another. From the Figure 5, we also remark that the livestock value added was sustainably increasing during the last two decades, without any significant fluctuation.

This trend of the agricultural production in Tunisia cannot be discussed without a close look at agricultural policy changes in the country. Even if the period discussed here is short (1989-2010), it is obvious how the free trade agreement with the EU made a growing and sustainable export/import growth in Tunisia. In this policy brief, we briefly discuss this latter relationship which will be undertaken in a deeper way by the APEWC-MENA project.

The period 1987-1991 corresponded to the 7th Economic and social Development Plan in Tunisia, when the country started deep structural reform supported by

the Agricultural Structural Adjustment program. A number of sector reforms were adopted and implemented that period, which mostly concerned the irrigation sector [6]. New water saving technologies and water tariffs were introduced in order to enhance the efficiency of irrigation water use.

In the period 1992-1996 (8th Development plan) main policies were oriented toward reforms in land tenure, agricultural credits and fiscal systems to support agricultural private investments. Many policies were settled to better integrate Tunisian farmers into the international markets. Transport subsidies and subsidies for markets investigations are the most important among them. In parallel, further efforts were undertaken in order to enhance investments in applied agricultural research and extension and the delivery of farmer support services.

The 9th Plan period (1997-2001) was dominated by a new Association Agreement with the European Union, WTO liberalization and the creation of the Arab Free Trade Area [6]. In this period, domestic reforms in prices and subsidy policies for both producers and consumers were undertaken. Many agricultural commodities were liberalized and some agricultural input subsidies were eliminated. However, prices remained fixed for some crops such as durum wheat and soft wheat. In the 10th development plan, it was remarkable that the government was oriented mainly toward encouraging private investments and smallholder agriculture's roles in social and regional development.

Many important implications can be drawn based on the evolution of the agricultural production value and the main policies orientations in the last two decades. It is mainly remarkable, among other, that policies for better integration of Tunisian farmers into international markets (which already started in the 8th agricultural development plan) in addition to the signed agreements, mainly with the EU, for trade liberation have permitted an important and sustainable increase of the agricultural production value in Tunisia since 2001.

Early Action Opportunities in Agriculture

Agricultural Labor Market: Regarding the problem of low agricultural labor supply agricultural modernization remains the optimal solution. Policy makers in Tunisia should further encourage modernization especially for small and medium size farms. Modernization will not simply allow the reduction of agricultural labor demand, but will also further enhance agricultural productivity in these types of farms. As noted above, low agricultural productivity in Tunisia is a persistent problem causing

many shortcomings mainly related to Tunisian farms competitiveness. Moreover, in case of more competitiveness between agriculture and other economic sectors, in terms of labor demand, the modernization of agriculture may also increase labor remuneration in the agricultural sector. This latter effect can be perceived in the medium and long terms.

Effect of Trade Liberalization: Allowing markets to set prices freely is an "apex reform" because it makes other reforms more effective [6]. For example, the more the price system rewards farmers for growing high-quality vegetables, the more vegetable-growers will take advantage of improvements in water-management, land markets, farmer groupings and extension services and so on.

In 2006, a report of the World Bank states that Tunisia's agricultural tariffs are still considered as high with respect to the regional and world standards. Peak tariffs are applied to 69 % of agricultural tariff lines and applied average rates for about 67%. This makes Tunisia considered as not yet substantially liberalized according to the World Trade Organization (WTO). The same study estimates that this protectionism has an effect mainly on consumers and taxpayers, of whom the costs of live accelerated by 4% because of the agricultural protection. This protectionism also matters for the economy as a whole which loses around 0.8% of GDP, according to the same report. In fact, the protection of the Tunisian cereals (where the local price is higher than the world price) is particularly costly. These results about the prohibitive cost of agricultural overprotection were also confirmed by a recent study [8].

Protection of the agricultural sector can always have negative impacts on activities which are in competition with importations. Barrier tariff may also affect exportations when capital is invested to produce commodities which may be imported instead of producing exportable agricultural commodities.

According to [5], Tunisia has to shift its agricultural policy toward ensuring only a minimum of protection. More exportation subsidies could be provided to farmers, which are theoretically justified because they ensure more competitiveness of Tunisian agricultural products on international markets. These policies have to be accompanied with a set of decision intending to provide better conditions for agricultural productivity growth (improving human capital through training, modernization, products quality, etc.).

Water Use Efficiency: Most important constraint of the agricultural sector in Tunisia nowadays is related to the limited natural resources, more precisely irrigation water. Even though a lot was done in terms of water use efficiency improvement during the last three decades, still a lot of work persists. As mentioned above, almost all studies investigating irrigation water use efficiency in Tunisia confirmed the low level of this indicator, showing that large volume of water is wasted, but also, large scope of improvement exists.

Further improvement of irrigation water sector can be done at three levels: juridical (especially for groundwater and water rights), technical and administrative. Juridical reforms of the water code are urgent in Tunisia where the property rights over water (especially groundwater) are not yet clear. Exchange of water between farmers (water markets) can also have important contribution to the improvement of the overall water sector efficiency by enhancing water productivity at farm levels [7]. The enhancement of the juridical framework for the protection of groundwater aquifers from the non-sustainable exploitation is also necessary. Mainly, laws about regulations execution and promotion of collective action for the use of this public resource are necessary [9].

Regarding technical issues, further encouragement of farmers to adopt improved irrigation technologies have to be provided to farmers. The current subsidies for investments in such technologies have to be maintained. In addition to this, improvement of services and training support for farmers in order to improve their irrigation skills are necessary to undertake. A clear comprehensive strategy framework for farmers training in irrigation related issues is necessary to establish as soon as possible in Tunisia.

Administration plays important role in water sector regulation. Currently, the administration in Tunisia is almost the only trainer and extension services provider for small and medium farmers. This means that the responsibility is really big. However, many administrative failures exist in Tunisia and have to be quickly revised in an overall assessment program which intends to improve and to modernize the Tunisian agricultural administration.

Given that Tunisian agriculture is mainly based on small and medium farms, the integration of this sector into international markets will be a hard but necessary task. Some efforts have been already done to integrate Tunisian farmers into foreign markets but a lot is still needed. Particularity, a clear and consistent strategy have

to be developed in Tunisia in order to i) enhance small farmers technical and human skills in order to better integrate foreign markets and ii) promote the agricultural sector for national and international investors, as being a profitable sector. For example, much progress has been done in Morocco in this direction, where the national Moroccan strategy for international markets integration is clearly based on these two previous pillars.

SWOT Analysis of the Tunisian Agriculture Sector: In this last section, we provide a SWOT analysis of the sector with a summary of main strengths, weaknesses, opportunities and threats facing the Tunisian agriculture (Table 1).

Concerning the strengths of the agricultural sector in Tunisia, it is important to notice that the sustained growth of this sector over the last three decades can be considered as an important factor of agricultural development in the short and medium run. Moreover the social role of the agricultural sector in rural development and income generation for the poorest population made it necessary to consider this sector from a social perspective in addition to the efficient economic perspective. This may justify necessary direct and indirect transfers that can be made in favor of this sector even in a liberalization context. The geographical location of Tunisia as well as its typical climate made it also particular for some commodities production that can be important source of income for the country, especially if we consider the close location of Tunisia to large international markets as the European and MENA ones.

However, the agricultural sector in Tunisia is also facing some challenges mainly related to social aspects of the agricultural exploitation in the country. In fact, the main weaknesses are related to the environmental degradation, where 20 000 ha are lost each year because of erosion and groundwater aquifers are overused in more than 25 % of the irrigated areas (irrigated from groundwater). Also, the intensification rate in some irrigated areas is still below the targeted potentials and much effort is needed to enhance it since it is directly related to the farms and agricultural competitiveness. Local water users associations, even though spread all over the country and taking into change the management of most of the irrigated areas in Tunisia, are still facing a lot of social, financial and organizational difficulties. Another main structural weaknesses of the Tunisian agriculture are the small average size of the farms (most farms in Tunisia are smaller than 10 ha) and the continuous land fragmentation.

Table 1: Main strengths, weaknesses, opportunities and threats of the Tunisian agriculture sector

Strengths
-Fast and sustainable growth rate over the last three decades
-important social contribution for the employment creation and income generation,
-Typical south Mediterranean climate and specific productions (olive oil and dates) easily exportable once necessary quality is ensured,
-Widely spread associative network for water resources management,
-Wide presence of the government agencies and administrations at the deep rural areas,
-Enhanced rural transport infrastructure,
Weaknesses
-Sustained erosion phenomenon,
-Overuse of groundwater aquifers in most of the privately irrigated areas,
-Low intensification rate in many irrigated areas,
-Loss of biodiversity because of the irrigation and agricultural extension,
-Low competitiveness compared to close markets (European, Moroccan, etc.)
-Small farm size of most agricultural farms in all regions and land fragmentation problems,
-Inappropriate price support policies,
-Low private organization level,
-Low education level of farmers,
-Weak performance of the extension services,
Opportunities
-Official willingness for modernization. The modernization process is running but investments need to be better targeted,
-Market liberalization context,
-Better targeting of supports and subsidies,
-Close geographical position to large international markets (European and MENA markets),
-New generation of educated farmers,
-Better integration of agricultural and agro-food sectors,
Threats
-Low social consciousness of farmers about sustainability issues of natural resources exploitation,
-Climate change and the dependency of the agricultural sector to climate variability,
-Current weak political context for regulation and laws enforcement,
-Fluctuant world market prices,
-High protection rate of the domestic agricultural sector,
- Increased energy prices,
-Overexploitation of the natural rangelands,

Source: Own elaboration.

Despite these challenges, some opportunities look to be in favor of the Tunisian agricultural sector. In fact, the policy makers in Tunisia are willing to modernize the sector. Most of the studies and research made during the last decade to enlighten policies and to investigate about investment priorities are a proof of this willingness and can be efficient drivers for further agricultural growth. Moreover, the market liberalization context and the close geographical location of Tunisia to Europe and to the MENA markets can also be a good opportunity for further development and growth of the agricultural sector, once appropriate price and support policies are adopted. Moreover, the new farmers generation in Tunisia is most of it well educated with willingness to adopt new technologies once efficiently targeted by the necessary extension services.

Major remaining threats of the Tunisian agriculture are relative to the low consciousness level of private farmers about sustainability issues, climate change impact

on rain fed agriculture and on the availability and use of water resources, fluctuation of the international food market prices and the increase of the energy prices. Moreover, the current weak political context after the 2010 revolution made it difficult to implement and to enforce various regulatory instruments especially for natural resources exploitation.

Concluding Remarks: The Tunisian agriculture was constantly progressing over the last four decades. Sustainable production levels of strategic agricultural commodities have been reached. The value added and the social and economic contribution of this sector has been also enhanced each year. Furthermore, the sector is extremely important for rural development and poverty reduction. However, major problems are still facing the modernization and the realization of further growth of the Tunisian agriculture. Main constraints are related to the education level, farms size and the overuse of natural resources, especially water for irrigation.

Intensive modernization wave is necessary to start in the future decade in order to make the Tunisian agriculture more competitive. This modernization wave will have to focus on many aspects, including the modernization of irrigation infrastructure, research and extension, central and local administrations, policies and institutions, education and farmers training, etc. This will be the most important way to enhance the role of The Tunisian agriculture in social, economic and environmental livelihood of the population.

Some further opportunities look to be in favor of the Tunisian agriculture despite the many challenges facing this sector. First of all, the political will do exist among high level policy makers to further modernize the sector. What research can do is then to urgently investigate investment priorities in modernizations which can be more efficient drivers for further agricultural growth. Moreover, the market liberalization context and the close geographical location of Tunisia to Europe and to the MENA markets is also a good opportunity for further development and growth of the agricultural sector. However, appropriate price and support policies have to be adopted.

Finally, the new farmers in Tunisia is more educated. They are more willing to adopt new technologies and can easily adopt it once efficiently targeted by the public extension and training administration.

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