e-tunisia : measuring the achievement

Dr. OUERGHI Mohamed Saïd
ouerghi@gmail.com

This paper will be presented at the Digital Opportunity Forum 2006[1]. It includes three parts. The first one is a brief presentation of the Digital Opportunity Index (DOI), and the e-tunisia project. The second one is intended to comment the results obtained when we apply the DIO to Tunisia and its neighbours. The last part contributes the discussion about the subject on what could be better done to improve digital opportunities in Tunisia.

Introduction

Achieving the challenges set by the United Nation Millennium Development Goals and World Summit for Information Society requires from governments to design and implement sustainable information and communications technologies (ICT) policies including policies to promote digital opportunity. That means that ICT government orientations and programs must aim to build people-centred, inclusive and development-oriented Information Society for all, where everyone can access, utilize and share information and knowledge.

There are many different indices which rank the world's countries according to their level of ICT penetration or their 'e-readiness', but there has never been agreement on what indicators to include or what methodology to use. To tackle this issue, a new methodology has been released for developing a composite Digital Opportunity Index (DOI). The DOI has been endorsed by the Tunis phase of the WSIS.

Even the DOI was developed and launched to follow-up and evaluate each country policies intended to promote digital opportunity, it could be seen as a practical tool that can help in the design and assessment of its ICT strategy, because it shows a country's strengths and weaknesses in different areas relative to its peers.

[1] Korea Agency for Digital Opportunity and Promotion (KADO) and International Telecommunication Union (ITU) Digital Oppourtunity Forum 2006, « *Working Together Toward the Inclusive Digital World* »
Seoul (Rep. Korea) – Aug. 31/ Sept. 1, 2006

DOI : what is it ?

Based on internationally endorsed indicators, the DOI is a composite index that measures digital opportunity or the possibility for the citizens to benefit from access to information that is "universal, ubiquitous, equitable and affordable".

It uses a range of indicators agreed by Partnership on Measuring ICT for Development, including data on service prices and the take-up of latest ICTs, to assess countries' performance and prospects to measure their progress in building the Information Society. It can be also used to enrich policy and inform policy-makers of the latest trends and impact analysis of ICT policies to identify successful policies and replicate them elsewhere.

As shown below (figure 1), the DOI has a structure based on three categories, each of them divided in two sub-categories.

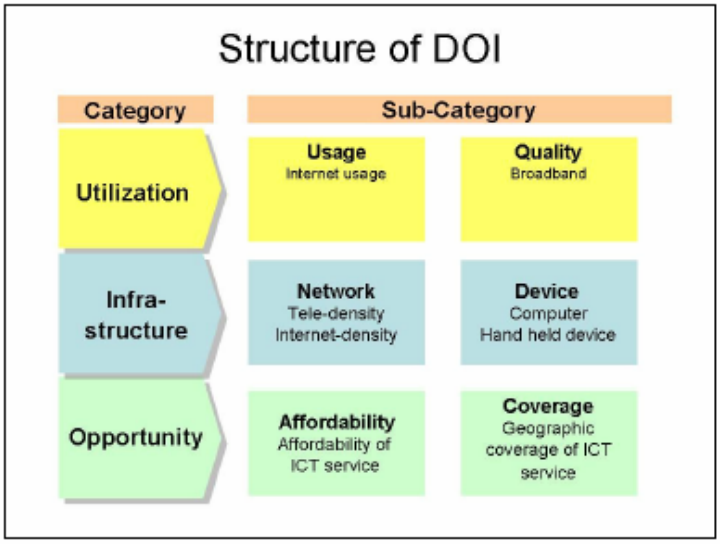

Figure 1 – Structure of DOI

- **Opportunity** measures the basic ***access*** and ***affordability*** needed to participate in the Information Society, in mobile population coverage, Internet access prices and mobile prices.
- **Infrastructure** includes measures of different ***networks*** (fixed lines, mobile cellular subscribers and household Internet access*)* and ***devices*** (households with a computer and mobile Internet access devices*)*.
- **Utilization** evaluates ***ICT usage*** in Internet users and broadband subscribers (fixed and mobile).

The DOI groups eleven ICT indicators, such as the percentage of population covered by cellular telephony, into the three categories of "Opportunity", "Infrastructure" and "Utilization". Theses indicators are intended to make possible the tracking and comparison of countries' ICT in different aspects of the Information Society. These indicators are illustrated in the following figure 2.

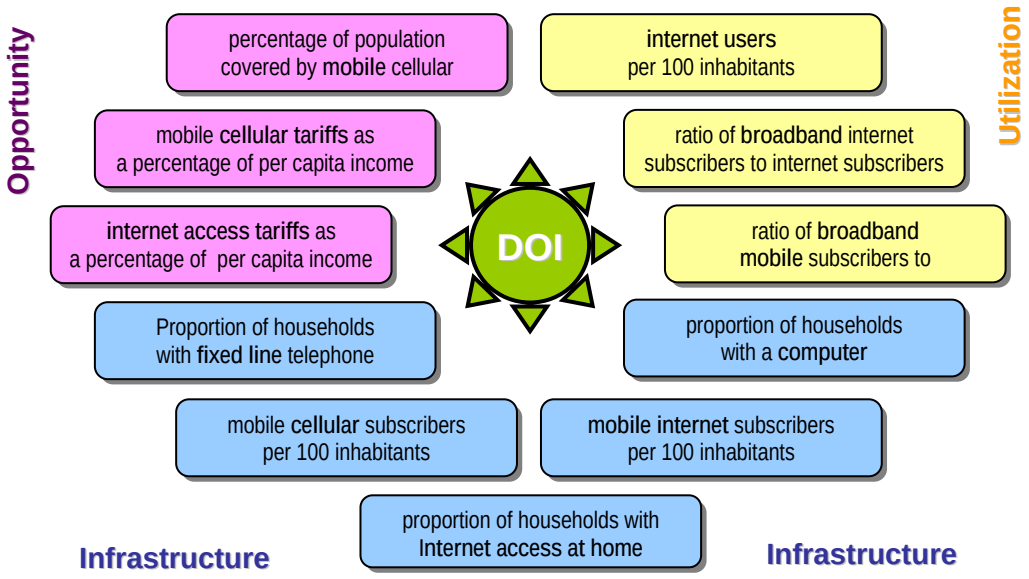

Figure 2 – The 11 indicators of DOI

In addition, the DOI has been developed according to a modular methodology, so that it can be easily extended, adapted for national use, or used alongside other indices. For instance, it can be split into different components for example between mobile and fixed networks and services or broadband and mobile internet. It can be also enhanced by eventually including indicators from the other core sets - such as the IDC Information Society Index (**ISI**), Networked Readiness Index (**NRI**), or the ITU Digital Access Index (**DAI**) - but where data is not yet widely available. It could also be linked to other indices outside the ICT sector like the UNDP's Human Development Index or the UNESCO Education Index, to investigate their impact on digital divide or on digital opportunities and so on.

A glance to e-tunisia project

Technology has always been a source of great expectations and challenges. Today, socio-economic growth depends increasingly on ICT. Almost by necessity, all countries need to harness this power and drive it to the desired sustainable changes. As part of this process, governments should, clearly, set and communicate their vision and goals.

Building its ICT strategy, Tunisia takes into account different important matters like bridging the digital divide, promoting public/private partnership, etc. Therefore, a special focus has been set on the investment environment, infrastructure and legal framework and a wild range of attractive incentives and encouragements is provided.

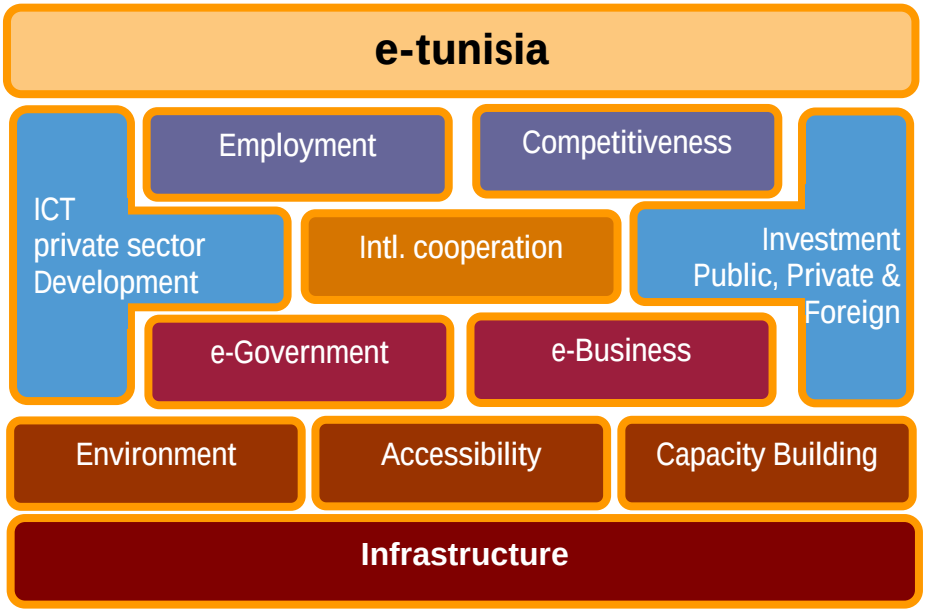

Figure 3 – Components of e-tunisia

This strategy, as a part of the ambitious plan to construct e-tunisia (figure 3), revolves around the following axes:

- Developing, modernizing and making use of the new technologies, in order to establish a communications infrastructure that meets the needs of an economy increasingly based on knowledge, especially with the reinforcement and extension of fixed and mobile telephone infrastructures and the development of data transmission networks through the use of the available modern technologies
- Consolidating the organizational and regulatory platform in order to ensure the openness of the sector to competition, especially with the reinforcement of the regulation function and the consolidation of the presence of private operators
- Reinforcing the human, technical and technological capacities, by promoting research, academic training and continued training, and through a wide dissemination of the digital culture that contributes to the establishment of the information and knowledge society
- Developing a network of innovative and high-performance enterprises with high added value, capable of achieving integration within the global market and of making Tunisia a regional technological pole of excellence.

In view of implementing this strategy, Tunisia has been selected, by several international firms, as a privileged destination in terms of setting up a software development plant, or customer assistance. Other tangible and encouraging results are obtained, for instance a more marked participation of the ICT sector in the GDP. The following Table 1 indicates the key indicators obtained vs. those expected by ICT sector in Tunisia.

Indicator	2004	2005	Expected in 2009
ICT / GDP	5.9%	7%	11.5%
ICT Growth	22%	24%	-
ICT Revenue (M. TND*)	1 200	1 500	2 400
Export (M. TND*)	100	120	-
FDI in ICT / FDI	10%	13.8%	-
ICT Investment (M. TND*)	1033	998	-
Private / Total ICT Investment	54.5%	46%	60%
Employment	40 700	55 200	80 000

* 1 USD = 0.8 TND

Table 1 - ICT Tunisia key indicators

In the last few years, appraisals and ratings granted to ICT in Tunisia by specialized agencies are globally positive. The selected data, given in Table 2, are those published by the following organizations : - **UNCTAD** – United Nations Conference on Trade And Development
- **ITU** – International Telecom Union
- **UNPAN** - United Nations Public Administration and Finance
- **UNDP** – United Nations Development Program
- **WEF** - World Economic Forum
- **FPM** - A.T. Kearney/Foreign Policy Magazine
- **WB** – World Bank
- **KADO** – Korean Agency for Digital Opportunity and Promotion

Indicator	Organization	Index	Rank	Date
DAI –Digital Access Index	ITU	0.41	31/181	2003
KAM (Knowledge Assessment Methodology) ICT index	WB	4.61	64/128	2004
Globalization Index (Technological Ranking)	FPM	-	46/62	2004
DOI – Digital Opportunity Index	ITU / UNCTAD / KADO	0.39	83/180	2005
Index of ICT Diffusion	UNCTAD	0.30	102/180	2005
e-Government Readiness	UNPAN	0.33	121/191	2005
NRI - Networked Readiness Index	WEF	0.33	36/102	2005

Table 2 - ICT Tunisia Ranking

Calculating and Analyzing the Tunisian DOI

To analyze the status, real use and potential of ICTs, Tunisian Ministry of Communication technologies (MTC) uses a dashboard with various quantitative and qualitative indicators (84 indicators organized into 10 distinct categories) including those intended to follow up the status of e-commerce certification, TV coverage, and so on. Some indicators are defined to track special matters as gender Internet access.

To measure the achievement, goalposts are associated to some indicators. In the same manner, and when it's possible, some information are listed to make possible the comparison with other (emerging and developed) countries and to better understand Tunisia strengths and weaknesses with respect to ICT. The following Table 3 illustrates the used instrument panel to survey ICT achievement.

Category	Indicator	2002	…	2005	May 2006	Goal Post (end 2006)	Goal Post (end 2009)	Indicator for other countries (2004)
Telephony	Fixed/mobile telephone density	17.6	…	68.79	73.17	50	80	-
	…	…	…	…	…	…	…	…
	Number of Frame Relay Lines	1,211	…	4,555	4,910	2,700	-	-
Computers	% of households with a computer	4.5	…	7.2	-	10.5	16	France : 41% Deutsch : 55%
	…	…	…	…	…	…	…	…
	"PC Family Program"	9,959		2,234	7,027	-	-	-
Internet	Number of Internet users	76,711		150,220	159,960	-	4,000,000	Portugal 1,252,800
	…	…	…	…	…	…	…	…
	% female for Internet access	40	…	41	-	-		-
Other categories	…	…	…	…	…	…	…	…

Table 3 – MCT dashboard for ICT

As we can expect, the used indicators by MTC includes some of the DOI indicators. The DOI within a country can be used to track the domestic digital divide or urban/rural disparities in access, not just in levels of access but in types of access. So we apply below this instrument to the Tunisian case and analyze its results.

1. Application of the Digital Opportunity Index to Tunisia

Regardless of how we measure it, there is an immense ICT gap a "digital divide", between developed and developing countries. The top ranks are dominated by industrial countries from North America, Western Europe and the Asian Tigers, while many of the lower ranking countries

are from Africa. This matter is confirmed by international studies from specialized international organization as UNCTAD. Based on partial data from ITU by 2004/2005, the same observation can be made when we calculate the DOI of 180 countries (figure 4).

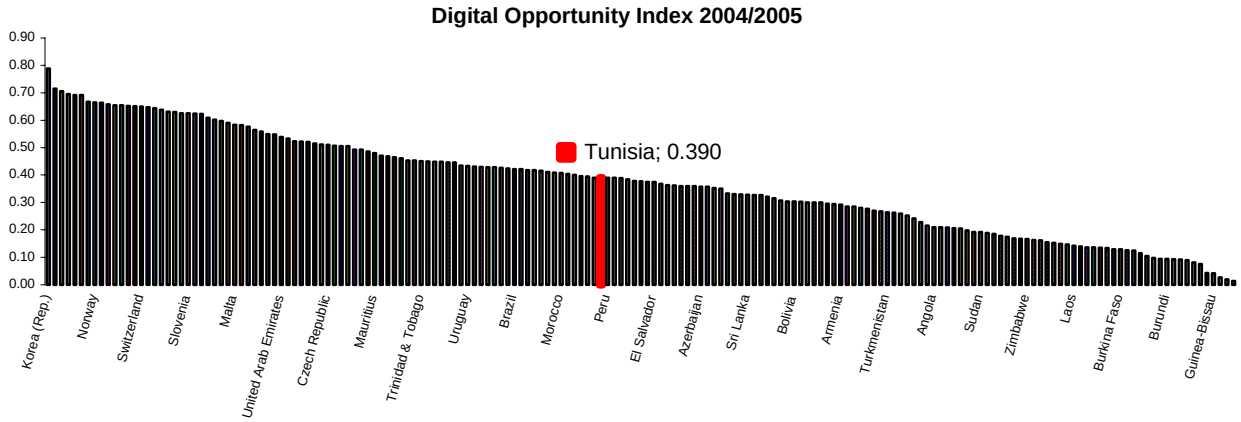

Figure 4 : DOI'2005 - Tunisia ranking

As usual, and in despite of its acceptable socio-economical performance and other facts, Tunisia is ranked by 2005 in a reasonable place. With a DOI value equal to 0.39, Tunisia takes the 83 place out of 180.

Compared to the developing economies and some emerging countries, Tunisia has to make great efforts to join the top 50. The following two charts (figure 5) confirm this observation and some work have to be done for example on all household ICT penetration components.

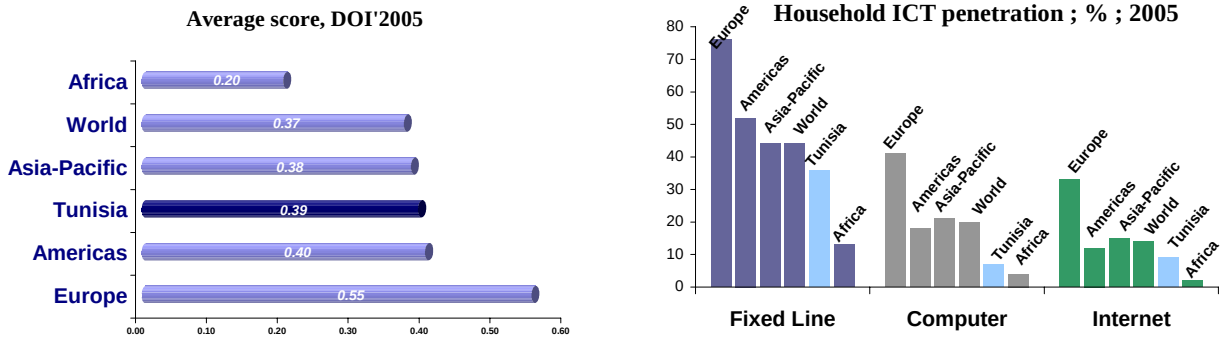

Figure 5 – Tunisia compared to others

These efforts will certainly assure that Tunisia could be the leader in Africa. For 2004/2005, compared to 51 other African economies, Tunisia is the top 10. As described in the following table 4, it's rank of the 5th in the DOI with better scores then African averages.

Rank in Africa	Economy	Opportunity	Infrastructure	Utilization	DOI 2004/05
1	Mauritius	0.98	0.41	0.06	0.48
2	Seychelles	0.97	0.32	0.10	0.46
3	Morocco	0.87	0.12	0.23	0.41
4	Algeria	0.91	0.15	0.12	0.39
5	Tunisia	0.96	0.16	0.05	0.39
6	Egypt	0.94	0.17	0.02	0.38
7	South Africa	0.90	0.18	0.05	0.38
8	Libya	0.92	0.12	0.01	0.35
9	Botswana	0.92	0.12	0.01	0.35
10	Cape Verde	0.80	0.15	0.04	0.33
Africa		**0.52**	**0.06**	**0.02**	**0.20**

Table 4 – DOI of the top 10 African economies

To make some analysis based on DOI, we calculate its value between 2000 and 2005. These results are illustrated here by the table presented in the appendix and the following two charts.

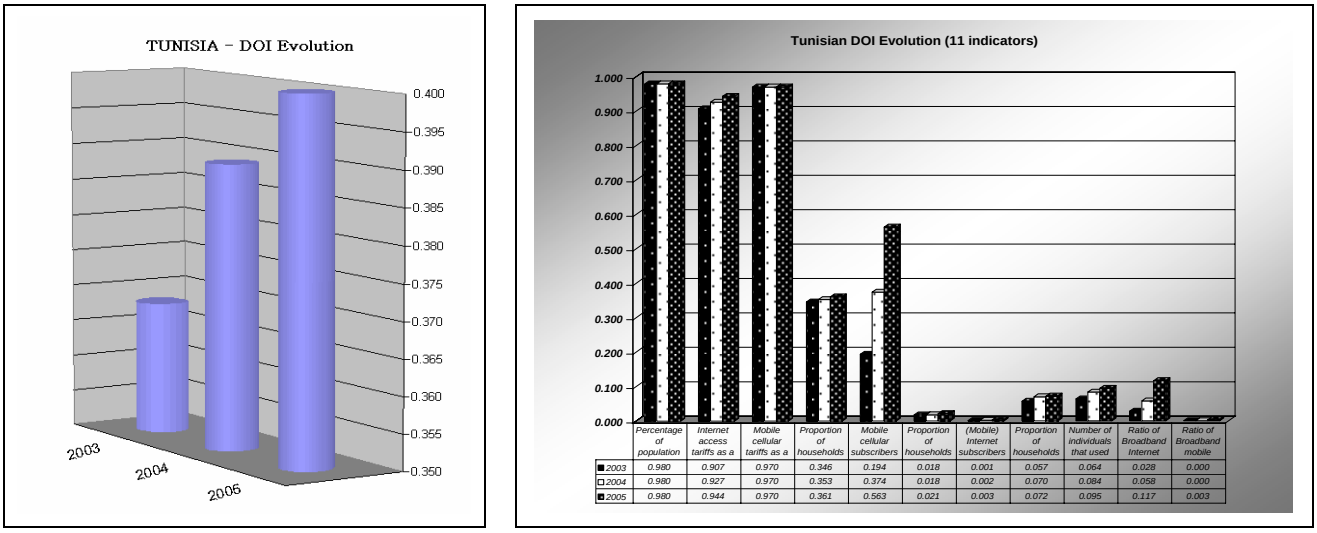

Figure 6 – Tunisian DOI score between 2003 and 2005

As we can observe on the figure 6, Tunisia's DOI is globally in constant evolution between 2003 and 2005: about 12% of growth. The calculated values for the DOI 11 indicators confirm also this improvement: lower prices and liberalization seems to be the essential reasons for that (the growth of "mobile cellular subscribers per 100 inhabitants" is 190%).

Analyzing in depth the three DOI categories we can affirm a second finding: ICT in Tunisia presents high opportunities but very low utilization. This low utilization is principally due to lower home penetration by computers[2], and especially with Internet connexion. Various factors could explain that:

[2] Tunisia has a programme for family computers. It calls for favorable financing of PCs for families in order to reach by 2009 a penetration rate twice that of what would be reached under current trends.

- the access costs to equipment and/or Internet (and especially when using the ADSL solution) was and remains for some category of the population too high,
- users lack the skills to use a PC and to correctly access to Internet (factors such as security or privacy concerns could also impact Internet usage, for instance services with on-line payment),
- the highest proportion of individuals accessing the Internet (between 16 to 24 year olds) can do it without any charge at school (and some other special places dedicated to youth) or work.

Unfortunately, as income data in this field are missing (we have actually no detailed data about urban/rural householders in the regions, young/oldest population, persons with higher/lesser education, etc), this aspect could not be further analyzed.

In the case of the ratios of broadband Internet subscribers Tunisia showed mitigated results. Most the fixed Internet subscribers in Tunisia are principally connected to the Dial-Up Internet. The offers on the ADSL were not, until very recently, interesting with regard to the price and speed.

The DOI is particularly innovative in its focus on new technologies such as broadband (fixed and mobile) and mobile Internet. That why, these data are currently near zero for Tunisia. However, we expect that the associated indicators will be better in the future, because we just launched a new program based on WiMax technology.

2. Comparing Tunisian DOI with its neighbours and Korea

As mentioned before, we want to analyze Tunisian effort with other countries. We choose to compare its digital opportunity score (obtained after the DOI'2005 calculation) with its neighbours and S. Korea.

As regards the rankings, Korea scored the top with 0.79 points while Tunisia, scored 0.39 taking the 83 place. So many efforts must be shown to hoist Tunisia on such a level of performance.

Economy		DOI	Rank
European Neighbours	Spain	0.61	25
	France	0.60	27
	Italy	0.59	28
	Malta	0.58	29
Tunisia		0.39	83
North Africain Neighbours	Algeria	0.39	82
	Libya	0.35	101
	Morocco	0.41	78
	Mauritania	0.14	159

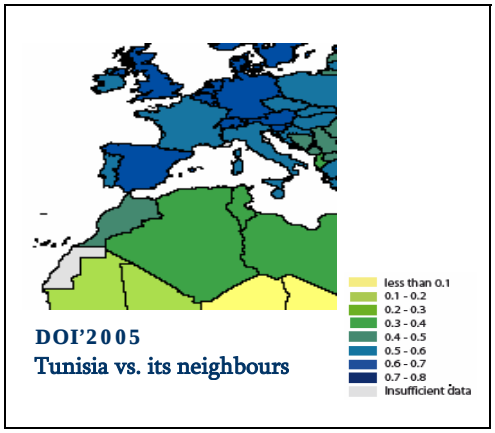

Figure 7 – DOI'2005 : Tunisia vs. its neighbours

As figure 7 shows it, the score obtained by Tunisia is in lower part of that obtained by each one of its European neighbors.

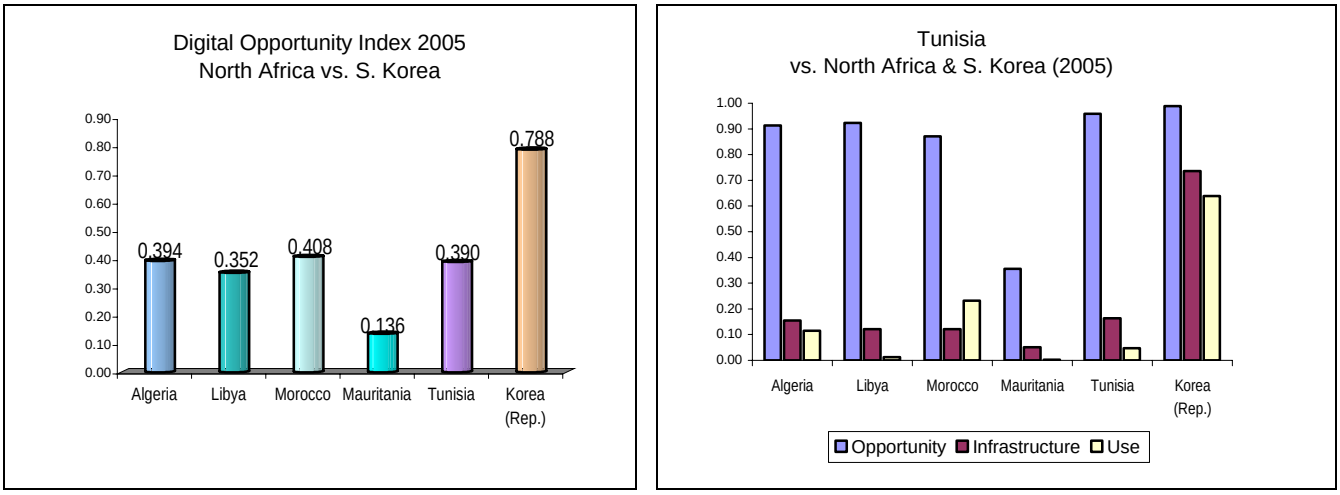

Figure 8 – DOI'2005 : Tunisia vs. Other North African Countries and S. Korea

Compared with the rest of North-African countries, Tunisia seems to be third after Morocco and Algeria but before Libya and Mauritania. A closer look at the component indicators must be done to interpret the reasons of this modest ranking.

	Opportunity	Infrastructure	Utilization
Mauritania	**161**	**132**	**162**
Morocco	**101**	**109**	**34**
Algeria	**81**	**94**	**65**
Tunisia	**58**	**56**	**77**
Libya	**76**	**108**	**128**

Table 5 – DOI Categories / Ranks of the North-African Countries

The table 5 focuses on ranks obtained by North-African countries for each DOI category. As we can see, Tunisia "Opportunity" and "Infrastructure" calculated ranks are better than its neighbours, but an unconvincing "Utilization" value. So what's the wrong with that, how can we improve these values, and so on ? A possible explanation for this observed phenomenon is about slow adoption rate of innovations. It seems essential therefore to remedies falling behind in Internet and broadband penetration. But this isn't enough, so any initiative to increase digital opportunities and enhance human development should operate at multiple layers.

Beyond the calculation of Tunisian DOI

During the past decade, ICTs have become available (in term of coverage and offer) for the Tunisian general public. However, a gap remains between users and non-users or between "haves" and "have-nots". Focusing on that, the public effort puts in place a clear policy to design and implement various programs for bridging this digital gap. One of them aims to provide economic resources, training, and easy and affordable access to information and communication services to at-risk members of the society (the disabled, the elderly…). Finally, the major results reached until now those listed in the following box1.

Households equipped with PCs: 4.5% in 2002, 7.2% in 2005

Households with Internet access: 1.4% in 2002, 2.1% in 2005

Number of email accounts: 190000, potentially both private enterprises and educational institutions

Internet users: 500000 in 2002, 1 million in 2005

300 public Internet service centers (PubliNets) throughout the country in 2005

100% of university and research institutions and secondary schools are connected up to the web. Even primary schools are being connected up.

Box 1 – Targeting the Digital Divide

Beyond what it has already done, a four axes program of scale is planned so that :

- ***The mobile and broadband Internet can rapidly spread every where.***

  Fast, cheap, reliable, and secure broadband is a prerequisite for the promotion of R&D, e-Business (at local, national, regional and international level), e-Government services for the citizen, the development of higher skills through lifelong education and e-Learning, the promotion of cultural heritage, tourism and new forms of entertainment, e-Health and social security services… The **Broadband Action Plan** included the fiber, ADSL and VSAT technologies. Few months ago, this plan was already modified to take into account the decision to use the WiMax technology as soon as possible on 2007.

- ***Every one can access to Internet from everywhere all over the territory.***

  The intended **Digital Culture Plan** will enhance the realization of the actual programmes: PC Family, Computer centers for children and specific groups, Internet & computer bus Labs, Development of PubliNets and other programs (such as the grants offered to the active NGO in ICT fields or the policies for HR capacity development on computer literacy). A new project aims to deliver 4 millions free citizen mail addresses by the end of 2009.

- ***ICT Business Sector can be as strong and competitive as possible.***

  The actual incentives and financial support (RITI : Venture Capital fund for ICT Innovating projects, VAT exoneration for ICT training programs, Stock options Act,

Incentives addressed to SME when they choice to be installed on the CyberParks, …) will be enforced with the **New Digital Economy Act** based on Outsourcing, Strategic alliance, Partnership on pilot technological projects.

- ***The Tunisian public administration can gradually offer its services on line.***

  In addition to the digitalization of these services, the **Digital Administration Plan** includes various government projects (such as e-government, electronic banking compensation, civil and transport registration, Post applications…) that are planed to be completed by end 2009.

This ambitious program is improved continuously. So, if we return back to the results obtained when we apply the 11 indicators of DOI to Tunisia Data, we can suggest some necessary policies to make sure that the medium and low DOI scores will grow better. The following Box2 includes three major suggestions.

Opportunity	**Ameliorate the PC Family program to promote the purchase of personal computers with legal software and with Internet access (enhance computer and Internet literacy programs, support the local industry of hardware and software …).**
Infrastructure	**Facilitate the deployment of broadband mobile infrastructure and make more Internet services available to all at fair and reasonable rates (extend mobile service coverage, promoting investment in advanced technologies …).**
Utilization	**Encourage the population to adopt recent innovations which brought faster and better technologies to access and to pay for services (increase the number of add-value services, elaborate new financial incitements to use e-payement for G2C services …).**

Box 2 – Suggestions to improve medium and low DOI scores

Besides that, and regarding that socio-economic and human development indicators are important as well as ICT core indicators ; we suggest the extension of the MCT dashboard for ICT in such a way that it will be possible to track indicators by technology, by region, by gender, by age, by income and so on. We think that maximum benefit could be achieved on ICT fields and in the same time could positively impact national development, if we know how to select the set of criteria that could interplay and becomes catalytic. Calculating the DOI with those extensions can help on identifying key areas where to intervene, implementing realistic and fundable programmes and projects, ensure policy coherence between ICT and national development policies at the national level, etc.

Endnotes

The following documents were the main source of the used data in this paper. All are available free of charge on the web.

1. ITU 2006, World Information Society Report, http://www.itu.int/wisr
2. ITU 2006, ICT Development Report - Measuring ICT For Social And Economic Development, http://ww.itu.int/ITU D/ict/
3. UNCTAD 2006, Digital Divide Report - ICT Diffusion Index 2005, www.unctad.org/stdev
4. Orbicom/ITU 2005, From The Digital Divide To Digital Opportunities : Measuring Infostates For Development, http://www.orbicom.uqam.ca
5. UPAN 2005, UN Global E-government Readiness Report: From E-government to E-inclusion, http://www.upan.org/dpepa-egovernment%20readiness%20report.asp

More information about ICT in Tunisia can be found at: www.infocom.tn

For more information and detail on the Digital Opportunity Index, see www.itu.int/doi

ITU/KADO Digital Opportunity Platform is explained in "ITU/Korea WSIS Thematic Meeting On Multi-Stakeholder Partnerships For Bridging The Digital Divide 2005 - Measuring Digital Opportunity" available at: http://ww.itu.int/wsisbridges

Appendix

Tunisia - Digital Opportunity Index 2000-2005

	2000	2001	2002	2003	2004	2005
Administrative data:						
Percentage of population covered by mobile cellular telephony			60.0	98.0	98.0	98.0
Internet access tariffs (20 hours per month)				22.32	20.00	16.17
Mobile cellular pre-paid tariff basket (OECD low user)						8.45
Number of Internet subscribers (fixed)	35,657	59,551	76,711	91,787	121,000	150,220
Broadband Internet subscribers (fixed)	-	-	-	2,590	7,000	17,573
Mobile cellular subscribers	119,165	389,208	574,334	1,917,530	3,735,695	5,680,726
Mobile Internet subscribers				10,000	20,000	30,000
Broadband mobile subscribers	-	-	-	-	-	17,573
Survey data:						
Number of individuals that used the Internet	260,000	410,000	505,500	630,000	835,000	953,770
Proportion of households with a computer	2.5	3.0	4.5	5.7	7.0	7.2
Proportion of households with Internet access at home		1.1	1.4	1.8	1.8	2.1
Proportion of households with a fixed line telephone		32.5	34.9	34.6	35.3	36.1
Reference data:						
Population	9,563,500	9,673,100	9,779,800	9,880,300	9,980,900	10,085,700
Households	2,001,300	2,065,300	2,109,800	2,168,700	2,219,900	2,273,600
Gross National Income per capita (US$)	$ 2,080	$ 2,060	$ 1,990	$ 2,240	$ 2,630	$ 2,860
Annual average exchange rate	1.3700	1.4387	1.4200	1.2900	1.2455	1.3057
Calculated data:						
Internet access tariffs (20 hours per month), in US$	…	…	…	$ 17.30	$ 16.06	$ 12.38
Internet access tariffs as a percentage of per capita income	…	…	…	9.27	7.33	5.65
Mobile cellular (OECD low user), pre-paid tariff basket, in US$	...	...	...	...	...	$ 6.47
Mobile cellular tariffs as a percentage of per capita income	…	…	…	2.95	2.95	2.95
Mobile cellular subscribers per 100 inhabitants	1.2	4.0	5.9	19.4	37.4	56.3
Mobile Internet subscribers per 100 inhabitants	...	...	...	0.1	0.2	0.3
Proportion of individuals that used the Internet	2.7	4.2	5.2	6.4	8.4	9.5
Ratio of Broadband Internet subscribers to Internet subscribers	-	-	-	2.8	5.8	11.7
Ratio of Broadband mobile subscribers to mobile subscribers	-	-	-	-	-	0.3

Tunisia - Digital Opportunity Index 2000-2005

	2000	2001	2002	2003	2004	2005
DIGITAL OPPORTUNITY INDEX	**…**	**…**	**…**	**0.368**	**0.389**	**0.413**
Opportunity	**…**	**…**	**…**	**0.952**	**0.958**	**0.964**
Percentage of population covered by mobile cellular telephony	…	…	0.600	0.980	0.980	0.980
Internet access tariffs as a percentage of per capita income	…	…	…	0.907	0.927	0.944
Mobile cellular tariffs as a percentage of per capita income	…	…	…	0.970	0.970	0.970
Infrastructure	**…**	**…**	**…**	**0.123**	**0.163**	**0.204**
Proportion of households with a fixed line telephone	…	0.325	0.349	0.346	0.353	0.361
Mobile cellular subscribers per 100 inhabitants	0.012	0.040	0.059	0.194	0.374	0.563
Proportion of households with Internet access at home	…	0.011	0.014	0.018	0.018	0.021
(Mobile) Internet subscribers per 100 inhabitants	…	…	…	0.001	0.002	0.003
Proportion of households with a computer	0.025	0.030	0.045	0.057	0.070	0.072
Utilization	**0.009**	**0.014**	**0.017**	**0.031**	**0.047**	**0.071**
Number of individuals that used the Internet	0.027	0.042	0.052	0.064	0.084	0.095
Ratio of Broadband Internet subscribers to Internet subscribers	…	…	…	0.028	0.058	0.117
Ratio of Broadband mobile subscribers to mobile subscribers	…	…	…	…	…	0.003