Chapter 10
Information and Communication Infrastructure

Jawad J. Abbassi

10.1 Regulatory Framework and Privatization

There is a global tendency towards establishing independent regulators to oversee the telecom sectors. In most of the SEMC, there are telecom regulatory bodies whose responsibilities include issuing licenses, allocating spectrum and numbers and/or regulating competition and prices. Despite claims of independence, many regulatory authorities remain closely tied to their governments, with ministers and other government officials heading and holding seats on their boards. Some regulators, e.g. in Lebanon, must obtain the Ministry's approval for all of their decisions. Moreover, in a number of countries, the telecom sectors remain under the control of people close to the ruling regimes who can influence tender outcomes.

Still, the establishment of regulators came with a general policy of privatization and liberalization. As a result, most SEMC opened up their markets for multiple players, enhancing competition and increasing the number and quality of services. With the exception of Lebanon and Syria, which have cellular duopolies under government control, other SEMC have fully competitive cellular markets, with three or more operators. Fixed-telephony lags, however, with only four countries having competitive markets. All of the SEMC except Libya have competitive internet markets, most of which are service-based, not infrastructure-based competition (Table 10.1). It must be noted that post-Qaddafi Libya has a feeble central government and the internet market is now in a state of flux.

All of the SEMC except Libya have attracted FDI and local private investment in their telecom sectors. In Algeria, the public sector has taken ownership away from foreign investors (probably related to the dispute between the government and Orascom Telecom).

J.J. Abbassi (✉)
Arab Advisors, Amman, Jordan
e-mail: jawad@arabadvisors.com

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Table 10.1 Status of competition in ICT 2013 (From the AAG)

Country	Cellular	Fixed	Internet
Algeria	Competitive	Monopoly	Competitive
Egypt	Competitive	Monopoly	Competitive
Israel	Competitive	Competitive	Competitive
Jordan	Competitive	Competitive	Competitive
Lebanon	Controlled Duopoly	Monopoly	Competitive
Libya	Competitive	Duopoly	Monopoly
Morocco	Competitive	Competitive	Competitive
Palestine	Competitive	Monopoly	Competitive
Syria	Controlled Duopoly	Monopoly	Competitive
Tunisia	Competitive	Competitive	Competitive
Turkey	Competitive	Competitive	Competitive

As in the rest of the world, regulators have found it easy to liberalize the cellular markets. Fixed and internet markets have proved to be trickier. For example, in Algeria, the second fixed-line operator exited after incurring massive losses. And ILD competition, where it exists, as in Jordan, Israel, Turkey, Morocco, Tunisia and Egypt, has resulted in a rapid decline of ILD revenues. But infrastructure-based fixed services competition has not been a stellar success in any SEMC.

While most SEMC have opened up their markets to competition, the incumbent telecommunication operators in more than half of them are still controlled by the government (Table 10.2). In 2012, five governments continued to own over 50 % of shares in the incumbents for fixed and mobile services. In Algeria, Lebanon, and Syria there is full state ownership and control of the incumbent operators, while Egypt and Tunisia have majority ownership (80 % and 65 % respectively).

10.2 Telecom Services Coverage

In terms of telecom service coverage in individual SEMC, in 2012, Libya represented the highest cellular services penetration rate (calculated as % of population) at 146.4 % followed by Jordan at 140.6 %. Meanwhile, the Syrian market had the lowest cellular penetration rate of 60.2 % by the end of 2012. This could be a result of lagging behind other countries in the liberalization of its cellular telephony market.

In terms of fixed telephony, Israel topped the list with 45.5 % fixed line penetration by the end of 2012 and Syria came in second at 20.3 %. Jordan had the lowest penetration rate at 6.3 %, which can be explained by fixed-cellular substitution due to the boom in the low cost prepaid cellular market which gives households an alternative to main lines.

Table 10.2 Privatization of telecom operators, 2012 (From the AAG)

Country	Operator	Government sector	Public sector (indirect government sector)	Private sector
Algeria	Djezzy	–	–	100 %
	Nedjma	–	–	100 %
	Mobilis	100 %	–	–
Egypt	Telecom Egypt	80 %	–	20 %
	Mobinil	–	–	100 %
	Vodafone Egypt	36 %		64 %
	Etisalat Misr	–	17 %	83 %
Jordan	Zain	0	–	100 %
	Orange	3 %	29 %	68 %
	Umniah	–	4 %	96 %
Lebanon	MTC Touch	100 %	0 %	0 %
	Alfa	100 %	0 %	0 %
	OGERO	100 %	0 %	0 %
Morocco	Maroc Telecom	30 %	0 %	70 %
	Meditel	0 %	0 %	100 %
	Wana	0 %	0 %	100 %
Palestine	Paltel	0 %	19.61 %	80.39 %
	Jawwal	0 %	9.4 %	90.7 %
	Wataniya Mobile	0 %	36.6 %	63.4 %
Syria	Syriatel	–	–	100 %
	MTN Syria	–	–	100 %
	Syrian Telecom	100 %	–	–
Tunisia	Tunisie Telecom	65 %	–	35 %%
	Tunisiana	–	–	100 %
	Orange Tunisie	–	–	100 %

Israel and Lebanon topped the list in fixed internet penetration rates by the end of 2012, while Egypt and Morocco came in last with penetration rates of 2.8 % and 2.1 %, respectively.

The bottom row of Table 10.3 presents average penetration rates for the entire region: 104.1 % in the case of cellular telephony, 13.5 % for fixed-line telephony and 6.2 % for fixed internet accounts, all by the end of 2012.

As compared to other regions, the Arab states, which comprise the majority of the SEMC, rank below the Americas and Europe but above Africa in terms of cellular, fixed and internet penetration rates.

Table 10.3 Cellular, fixed and internet coverage, 2012 (From AAG, ITU and WB)

Country	Cellular lines (000s)	Cellular penetration	Fixed lines (000s)	Fixed lines' penetration	Fixed internet accounts (000s)	Fixed internet accounts' penetration
Algeria	37,202	98.2 %	3,199	8.4 %	2,241	5.9 %
Egypt	97,372	116.4 %	7,300	8.7 %	2,330	2.8 %
Israel	9,225	116.7 %	3,594	45.5 %	1,937[a]	24.5 %
Jordan	8,984	140.6 %	400	6.3 %	301	4.7 %
Lebanon	3,700	86.2 %	865	20.2 %	488	11.4 %
Libya	9,587	146.4 %	814	12.4 %	725	11.1 %
Morocco	39,016	119.7 %	3,279	10.1 %	685	2.1 %
Palestine	3,287	76.6 %	396	9.2 %	186	4.3 %
Syria	13,167	60.2 %	4,452	20.3 %	782	3.6 %
Tunisia	12,841	119.1 %	1,106	10.3 %	572	5.3 %
Turkey	67,681	91.5 %	13,860	18.7 %	7,858.20[a]	10.6 %
Total	302,062	104.1 %	39,238	13.5 %	18,106	6.2 %

Notes: Algeria's internet accounts include the ADSL accounts only
[a]Broadband accounts only

Despite high cellular penetration rates in some countries, the average regional penetration rate (101.6 %) is lower as compared to developed markets across the world; in Europe, for instance, penetration rates are 123.3 %. This means that quite a large part of the population remains unserved or underserved in some SEMC (Fig. 10.1).

Similarly to cellular services, Arab countries had low fixed telephony and internet penetration when compared to Europe, the Americas and the CIS. Europe had the highest fixed line penetration rate, followed by the Americas, the CIS and the Asia and Pacific region. Fixed-line coverage in the Arab region is a quarter of that in Europe (Fig. 10.2).

Europe, the Americas, and the CIS also took the lead with respect to internet users penetration rates. However, Arab countries had higher penetration rates than the Asia and Pacific region and Africa. The internet service coverage in Arab countries is less than two thirds that of Europe (Fig. 10.3).

10.3 Infrastructure Indexes

This section provides a summary comparison of the SEMC to the rest of the world with respect to global indices such as the TII, GeGDI and WMI.

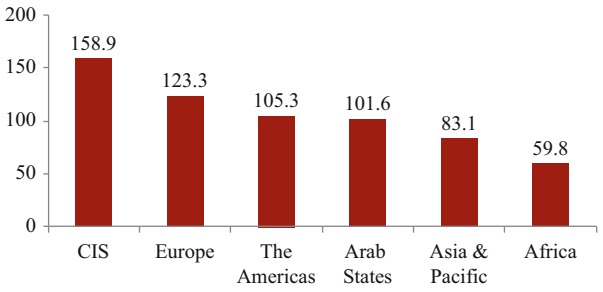

Fig. 10.1 Cellular ranking: subscription estimates per 100 inhabitants, 2012 (From ITU)

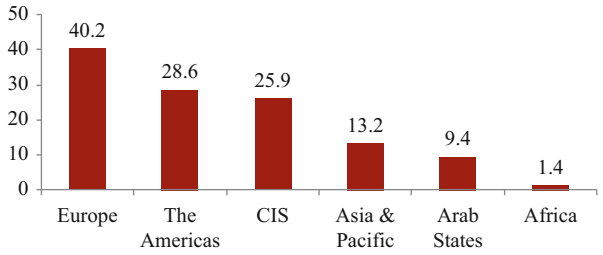

Fig. 10.2 Fixed line ranking: estimates of number of lines per 100 inhabitants, 2012 (From ITU)

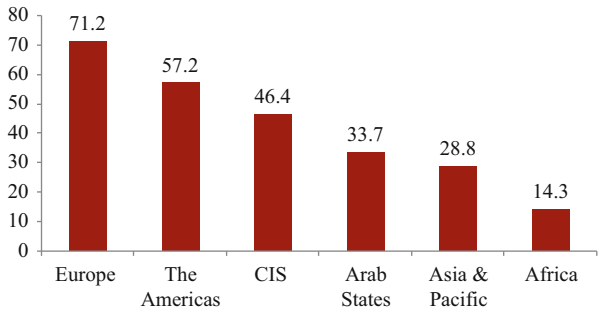

Fig. 10.3 Internet users ranking: estimates of users per 100 inhabitants, 2012 (From ITU)

10.3.1 The Telecommunication Infrastructure Index

The TII is a weighted average index of six indices of a country's ICT infrastructure capacity, which includes the number of PCs, internet users, fixed-telephony lines, online population, mobile phones and TV sets, all per 1,000 inhabitants.

Of the SEMC, only Israel, Libya and Turkey have TIIs above the world average. Israel scored the highest TII at 0.686, followed by Libya and Turkey, with indices of 0.374 and 0.348, respectively. The TII of the remaining seven SEMC is comparable to the world average, except for Algeria which has an index of 0.181 (Fig. 10.4).

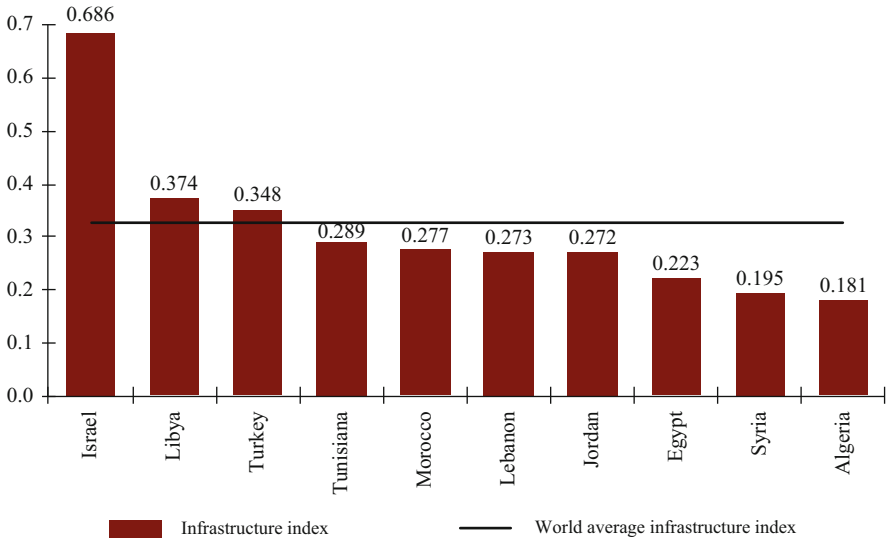

Fig. 10.4 The telecommunication infrastructure index, 2012 (From www2.unpan.org)

10.3.2 Global e-Government Development Index

The GeGDI is a measure created by the UN to assess e-government initiatives. It shows the level of development of e-government services and measures the capacity and willingness of individual countries to use them for ICT-led development.

According to Fig. 10.5, all SEMC made some progress in this area. However, the GeGDI varies among individual SEMC. Three of them (Israel, Turkey and Lebanon) rank above the global average.

AAG (2013) compared the main e-government portals of the Arab countries (by August 2013) based on the presence of various features dealing with information availability, service delivery, and public access. Features assessed included: mobile messaging services, social networking presence, online publications, e-mail registration, user payments, presence of online services and online database availability on the website. The comparison was done for eight SEMC: Algeria, Egypt, Jordan, Lebanon, Libya, Morocco, Syria and Tunisia.

Based on this comparison, all of the analyzed portals provided users with online services and online databases, 50 % of them offered online publications, and only three portals offered user payment options. Five e-government portals gave the user the option of either registering an email account or submitting their personal e-mail to receive periodic updates from the government. Furthermore, only two out of the eight analyzed e-government portals provides mobile messaging services. Meanwhile, five portals were present on social networks such as Facebook and Twitter. Overall, Morocco and Tunisia had the most advanced e-government websites.

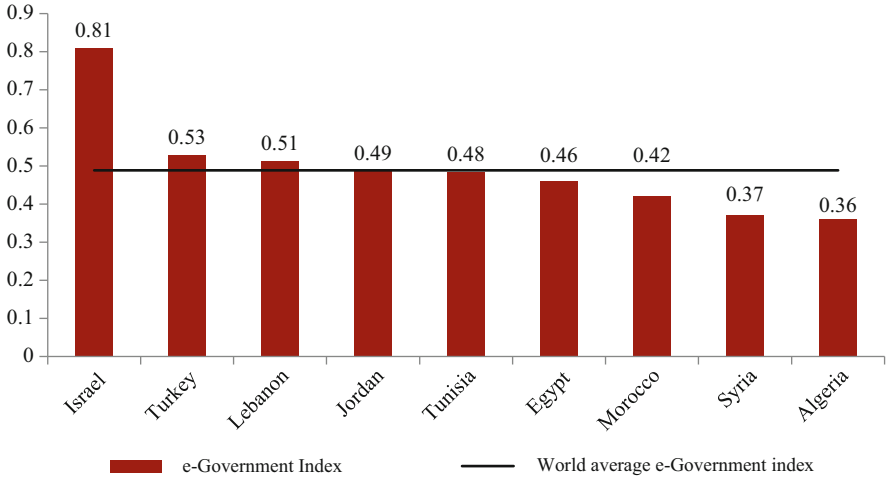

Fig. 10.5 Global e-government development index, 2012 (From UN e-Government For The People)

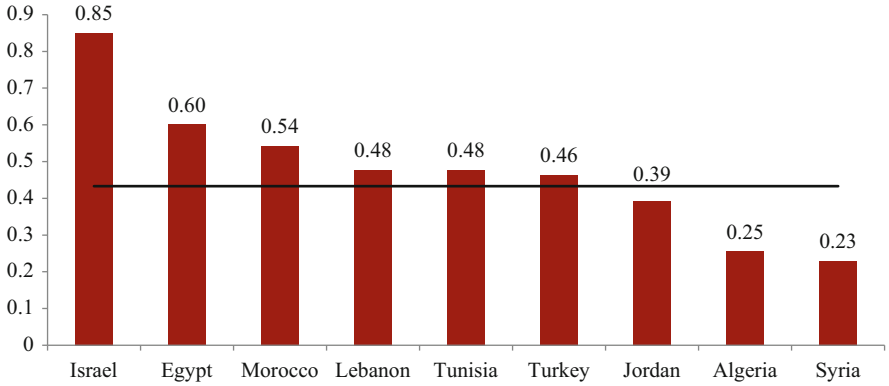

Fig. 10.6 Web measure index, 2012 (From www2.unpan.org)

10.3.3 Web Measure Index

The WMI illustrates the development of a country's e-services which encompass e-commerce and e-government. The e-government index depends on three indices, which are the WMI, TII and Human Capital index. The WMI measures how developed a country is in terms of e-services. When a country progresses on the telecom and internet fronts, it is ranked higher in the ranking.

According to Fig. 10.6, Israel, Egypt, Morocco, Lebanon, Tunisia and Turkey score above the global average, while Jordan, Algeria, and Syria fall below this average.

According to the AAG online surveys, 49.2 % of internet users in Egypt and 52.8 % in Jordan declared that they used e-government services. However, the use of some e-government services by internet users does not necessarily mean that the country has an advanced e-government system.

10.4 E-commerce

We define electronic commerce, commonly known as e-commerce or e-business, as the process of buying and selling products or services through electronic systems such as the internet and other computer networks.

E-commerce is also witnessing an expansion, as evidenced by the increasing number of e-commerce portals in Arab countries. The availability of alternative payment options such as prepaid cards and phone payments motivate a population that is less willing to use credit cards to shop online.

Figure 10.7 shows that the UAE and Egypt house the largest share of the analyzed e-commerce portals that target the Arab world, i.e. e-commerce portals that are focused on the Arab consumers (AAG 2012a).

According to the AAG survey conducted in 2012, 17 % of Jordanian respondents and 15 % of Egyptian ones used e-commerce services. Despite their rapid increase, e-commerce services in the Arab region still lag behind the rest of the world.

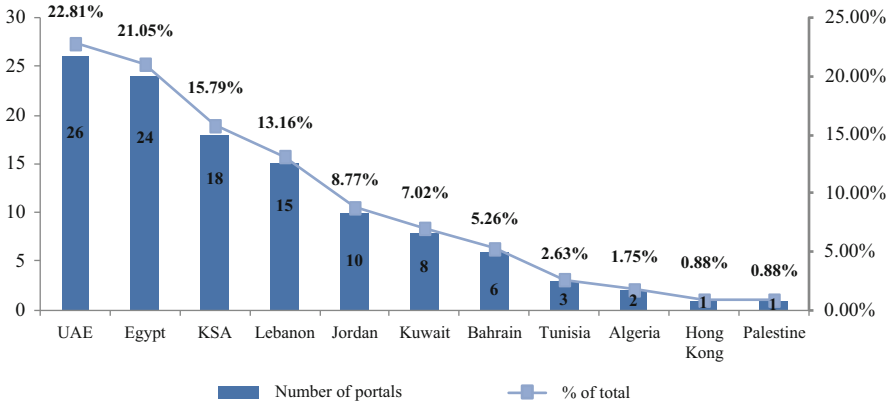

Fig. 10.7 E-commerce portals targeting the Arab World; locations of headquarters, August 2012 (From AAG 2012a) (Note: Percentages are calculated from 114 analyzed e-commerce portals)

10.5 Prices and Relative Pricing Status

The AAG (2012b) calculated the 'relative pricing status' (high cost, fair, low cost) for the individual SEMC. It depends on whether the regional status of a country's GDP per capita matches that of the regional status of the average minute rate. For example, a country with an above-average GDP per capita and above-average minute rate would represent a fair relative pricing status.

This analysis of post-paid and prepaid tariffs in Arab countries revealed that Morocco had the highest cellular rates while Egypt had the lowest across both subscription types. As Tables 10.4 and 10.5 reveal, the differences in pricing are quite high between the countries and have more to do with the competitive situation in each country than the income level of its citizens.

However, it must be noted that we are comparing the published rates and are not accounting for the promotions, offers of unlimited calls to specific numbers, seasonable offers, on-net traffic as opposed to off-net traffic rates, etc. While the ARPM rates would more accurately reflect relative prices in each country, they

Table 10.4 Postpaid average minute rates, July 2012 (From AAG 2012b)

Country	Postpaid average peak and off-peak minute rate (USD)	Regional status	GDP per capita (USD)	Regional status	Relative pricing status
Morocco	0.17	Above average	2,838	Below average	High cost
Palestine[a]	0.14	Above average	1,421	Below average	High cost
Palestine[b]	0.11	Above average	1,421	Below average	High cost
Lebanon	0.1	Above average	8,757	Below average	High cost
Tunisia	0.11	Above average	4,189	Below average	High cost
Jordan	0.08	Below average	4,334	Below average	Fair
Algeria	0.09	Below average	4,415	Below average	Fair
Syria	0.09	Below average	2,867	Below average	Fair
Egypt	0.04	Below average	1,938	Below average	Fair
Average	0.10		4,105		
Median	0.1		3,601		
Minimum	0.04		1,421		
Maximum	0.17		8,757		

Notes (a) The rates include the off-net minute rates of Jawwal and Wataniya with the Israeli operators; (b) The rates do not include the off-net minute rates of Jawwal and Wataniya with the Israeli operators

Table 10.5 Prepaid average minute rates, July 2012 (From AAG 2012b)

Country	Prepaid average peak and off-peak minute rate (USD)	Regional status	GDP per capita (USD)	Regional status	Relative pricing status
Morocco	0.4	Above average	2,838	Below average	High cost
Lebanon	0.31	Above average	8,757	Below average	High cost
Palestine[a]	0.17	Above average	1,421	Below average	High cost
Tunisia	0.12	Below average	4,189	Below average	Fair
Libya	0.04	Below average	12,285	Below average	Fair
Palestine[b]	0.14	Above average	1,421	Below average	High cost
Algeria	0.1	Below average	4,415	Below average	Fair
Syria	0.12	Below average	2,867	Below average	Fair
Jordan	0.06	Below average	4,334	Below average	Fair
Egypt	0.03	Below average	1,938	Below average	Fair
Average	0.149		4,447		
Median	0.12		3,528		
Minimum	0.03		1,421		
Maximum	0.4		12,285		

Notes: (a) The rates include the off-net rates of Jawwal and Wataniya with the Israeli operators; (b) The rates do not include the off-net rates of Jawwal and Wataniya with the Israeli operators

were not available. Not all operators are ready to share them and they change frequently as a result of seasonal promotions and offers. However, it must be noted that the ARPM in virtually all countries would be lower than the simple average rates.

As for the internet market, the AAG (2012c) compared residential rates for the ADSL 1,024 Kbps download speeds (the most common speed offered in the Arab region) towards the end of 2012. The total annual cost of using the broadband services (the column 2 of Table 10.6) was divided by GDP per capita (column 1), obtaining a measure of relative cost (cost of broadband as a % of GDP per capita). Total annual cost was calculated by adding the connection fees and yearly subscription fees. It was assumed that the connection fees were amortized over the first year of subscription.

A high ratio in Table 10.6 indicates that the broadband cost is high relative to GDP per capita, making its unaffordable for large sections of the population. The lower the ratio, the more affordable the service is.

Table 10.6 Total annual costs of 1,024 Kbps ADSL as a % of GDP per capita, September 2012 (From AAG 2012c)

Country	GDP per capita 2012	Total annual cost (USD)	Annual cost as a % of GDP per capita
Algeria	4,415.00	316	7.2 %
Egypt	1,943.00	243	12.5 %
Jordan	4,499.00	370	8.2 %
Lebanon	8,757.00	373	4.3 %
Morocco	3,130.00	146	4.7 %
Palestine	1,415.00	435	30.7 %
Syria	2,867.00	684	23.9 %
Tunisia	4,177.00	202	4.8 %
Average	3,900	346	12.0 %
Median	3,654	343	7.7 %
Minimum	8,757	146	4.3 %
Maximum	1,415	684	30.7 %

Among the analyzed countries, the total annual cost of residential ADSL services ranged from USD 146 per year in Morocco (4.7 % of GDP per capita) to USD 435 per year in Palestine (31 % of GDP per capita). Thus Palestine had the most expensive services relative to GDP (30.7 %), followed by Syria (23.9 %), Egypt (12.5 %), Jordan (8.2 %), Algeria (7.2 %), Tunisia (4.8 %), Morocco (4.7 %) and Lebanon (4.3 %).

10.6 Perspectives of ICT Services in the SEMC

Economists have done extensive research on the effects of a well-developed telecom and broadband infrastructure on social and economic wellbeing. An increase in ICT services penetration levels leads to enhanced economic growth and poverty alleviation.

For example, Qiang (2009) and Qiang and Rossotto (2009) studied the impact of telecommunications penetration on economic growth rates at the country level. According to their analysis of 120 countries, for every 10 percentage point increase in the penetration of mobile phones, there is an increase in economic growth of 0.81 percentage points in developing countries versus 0.60 percentage points in developed countries. This was confirmed by a study by Lee et al. (2009). Badran (2011) conducted a similar study in the context of the Arab world and her results also showed positive GDP growth effects correlated with enhanced penetration levels of telecom services.

Examples of the beneficial impact of mobile phone penetration are numerous. For instance, a cellular line in the hands of farmers or fishermen helps them follow

market prices which allows them to sell their products for the best possible price rather than be locked into what the middlemen in their villages can offer. Similarly, a reliable internet connection would allow a translator to expand his potential client base to the whole world rather than his immediate neighborhood.

The studies also found that ICT promotes growth more effectively in developing countries than in developed ones. This is because telecommunication services help improve market functioning, reduce transaction costs, and increase productivity through better management in both the public and private sectors. Additionally, reliable broadband connectivity is a major prerequisite for export-oriented service industries such as call centers, outsourcing and financial services.

Broadband is considered a general purpose technology, which is a prerequisite for many vital services, and is a necessary condition for innovation and growth worldwide. For example, Badran (2011) refers to the opinions of many economists and policymakers who argue that broadband access can help in the move towards a knowledge based economy.

The telecom sector itself is a major job creator. Telecom operators generate jobs both directly and indirectly through their large retail networks. In addition, the sector is a major taxpayer, in terms of income taxes, revenue sharing and indirect taxes. It has also proven to be able to generate major FDI flows.

The telecom sector, including broadband, facilitates the development of other sectors. It allows for efficient communication which is essential for businesses. Reliable connectivity is a prerequisite for strong and viable financial, manufacturing and service-based businesses. Moreover, it has contributed to the creation of a new system of broadband-dependent businesses that includes major success stories such as the Google, Skype, eBay, Amazon, Facebook and Twitter.

The importance of social networks in terms of enhancing transparency and social mobilization was clearly demonstrated during the Arab Spring in 2011, especially when access to the government-controlled media was restricted.

To sum up, ICT development has an impact on job creation and enhancing aggregate demand and, possibly, on better governance. Competition is not only vital for the growth of the telecom sector, but it is also important for the development of the whole economy. Competition in the telecom industry induces innovation, reduces costs and prices, and improves the quality of its services in the long run.

In the ICT sector, individual countries represent various degrees of market sophistication. We define a sophisticated ICT market as one that is competitive and offers liberalized telecom services with multiple large operators (at least three or four) without the dominance of one operator in any segment and with effective participation of the private sector. Such a market should have vast international connectivity through multiple routes and technologies, for example, terrestrial FO, terrestrial microwave, submarine FO, satellites, etc. It should operate under a well-structured and effective regulator that ensures high competitiveness and service standards. With a favorable investment climate (including low inflation), it would attract the necessary financing at competitive costs.

On the other hand, sustained economic growth and the fair distribution of its results among various population groups (with a reduction in poverty and unemployment) can underpin the further development of the ICT sector.

Multiple factors affect the level of ICT sophistication. They include the country's legal structures and a degree of respect for the rule of law. A consistent law enforcement and a fair, independent and efficient judiciary contribute to enhancing business confidence in a given country and encourage foreign and local investments. Unfortunately, the SEMC vary significantly in terms of judiciary independence and rule of law.

A favorable political context is also a prerequisite for a sophisticated ICT sector. Such an ideal context means a fully democratic system of government with a free press and periodical elections that are free and fair and lead to a rotation of governments. Such a context can enhance the regulatory framework and demand for advanced ICT services, and encourage investments leading to a virtuous cycle that will benefit a sophisticated and expanding ICT sector. On the contrary, political strife and unrest can make the ICT sector one of its early victims.

In 2011, Israel and Turkey led in the sophistication of ICT markets among the SEMC. The countries' ICT market sophistication coincided with a favorable business climate as measured by the WB DB rankings (see Chap. 5).

Jordan, Morocco, Egypt and Tunisia follow Israel and Turkey when it comes to ICT market sophistication. They have been pioneers in ICT market liberalization among Arab countries. Algeria and Palestine are next in terms of sophistication of their ICT markets, followed by a distant Syria and Lebanon. The Libyan ICT market remains the least sophisticated and is still subject to central governmental planning.

The region evidently lags in the development of broadband markets. For example, Syria continues to lag in terms of broadband penetration despite increasing demand for such services as demonstrated by the popularity of dialup internet.

10.7 Concluding Remarks and the Role of the EU

The SEMC have lagged behind other regions in terms of market liberalization of their telecom sectors. And the MENA has been ranked as the most restrictive region in trade of fixed telecom services among a group of Asian and transition economies according to World Bank (2011). Yet this can change fairly rapidly as more countries adopt liberalization policies and good governance that can attract FDI and expand their markets. Being a laggard may actually bring some benefits, as countries adopt best practices and learn from the pitfalls of earlier liberalizers.

As the southern neighbors of the EU, the SEMC can benefit from Europe's interest and support to the region. Good governance, growth, and stability may contribute to the prosperity of both the SEMC and Europe. The EU can play a positive role by supporting institutional reforms and encouraging trade and investments with the SEMC which, in turn, can improve the investment climate in the

region. As discussed in Chap. 2, much can be gained from moving from the 'shallow', tariff-reducing approach to trade liberalization to a 'deep' integration that aims at reducing regulatory and institutional barriers.

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