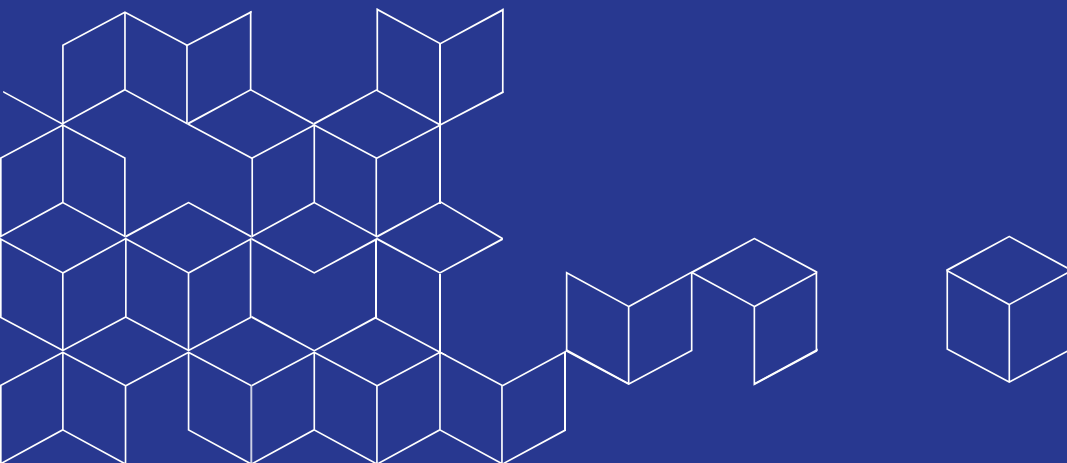




Development Opportunities for Lebanon's ICT Subsectors

A joint study by the Investment Development Authority of Lebanon
(IDAL) and Lebanon for Entrepreneurs (LFE)

September 2015



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Abbreviations

Advertising Technology	Ad Tech
Business Intelligence	BI
Business Process Management	BPM
Business-to-Consumer	B2C
Compound Annual Growth Rate	CAGR
Customer Relationship Management	CRM
Enterprise Content Management	ECM
Enterprise Resource Planning	ERP
Gross Domestic Expenditure on Research and Development	GERD
Gross Domestic Product	GDP
Gulf Cooperation Council	GCC
Information and Communications Technology	ICT
Information Technology	IT
Infrastructure as a Service	IaaS
Massive Open Online Course	MOOC
Middle East and Africa	MEA
Middle East and North Africa	MENA
Over-The-Top	OTT
Pay Per Click	PPC
Personal Computer	PC
Platform as a Service	PaaS
Research and Development	R&D
Search Engine Optimization	SEO
Small and Medium Enterprises	SME
Software as a Service	SaaS
United States Dollar	USD
Value-Added Services	VAS

Introduction

Lebanon’s ICT sector is fast-growing, with a 2014 market size of USD 381 million¹ that is expected to reach USD 530 million by 2017². The sector has grown by an average annual rate of 7.9% over the period 2009-2014³, and is expected to grow at a CAGR of 7.24% from 2015 to 2018⁴. According to Business Monitor International, Lebanon's ICT market is forecast to be “a regional outperformer over the medium term, as strong economic growth strengthens market expansion”.⁵ In 2013, Lebanon ranked fifth in the Middle East and North Africa based on the ICT Development Index⁶.

Table 1 displays ICT’s forecast contribution to the Lebanese economy by 2017. ICT’s impact on the GDP – whether direct or indirect – is forecast to be greater than USD 6 billion, and its employment impact is estimated to be around 6000 new jobs.⁷ Moreover, exports of ICT-related services constituted an estimated 34.8% of total service exports in 2013⁸, one of the highest in the region.

Table 1: Forecast Contribution of the ICT Sector to the Economy by 2017

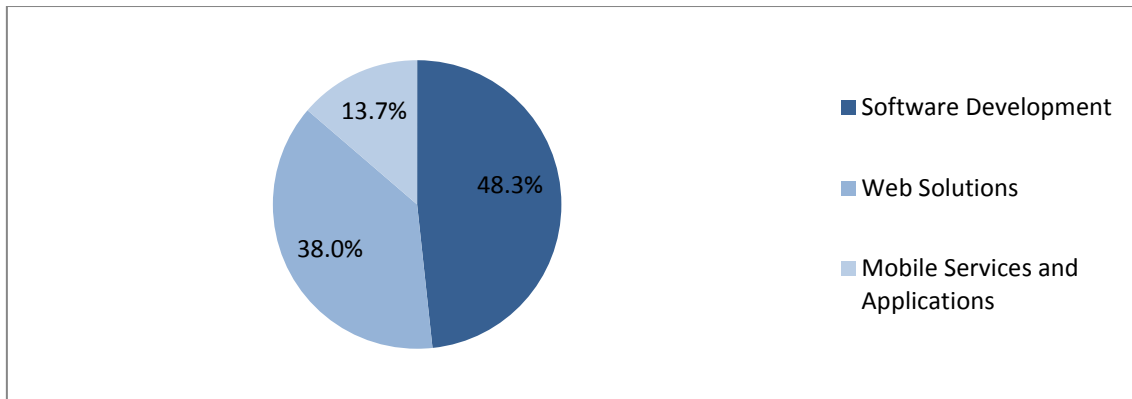
<p>Direct Impact of ICT on GDP Direct impact on GDP due to ICT spend</p> <p>USD ~3.2-3.4 bn</p>	<p>Indirect Impact of ICT on GDP Indirect impact on GDP due to synergies with key economic sectors</p> <p>USD ~ 3-3.3 bn</p>
<p>Indirect non-ICT Impact on GDP Implicit impact on GDP from capital expenditures, due to capital deepening and high Total Factor Productivity (TFP)</p> <p>USD 0.8 - 1.0 bn</p>	<p>Employment Impact Additional direct and indirect jobs created in the ICT sector and other key economic sectors</p> <p>+ ~ 6,000 jobs</p>
<p>Social Impact Social benefits stemming from ICT adoption, measured by Gallup-Healthways's Well-Being Index Uplift</p> <p>+4%</p>	<p>Government Proceeds ICT proceeds via revenue share, VAT, corporate tax, privatization, spectrum fees, and savings on national debt</p> <p>USD ~ 9 bn</p>

Source: Ministry of Telecommunications Progress Report 2013; Booz & Co. Analysis.⁹

Lebanon’s ICT sector is still in its infancy stage, with traditional Web design and software development dominating its activities (Figure 1). Covered activities include fast-growing segments

worldwide such as content development, mobile and smartphone applications, specialized applications, mobile and online gaming, Web development, e-services, and software outsourcing.

Figure 1: Distribution of IT Companies by Type of Activity



Source: Investment Development Authority of Lebanon (IDAL), 2015

Objective of the Study

The objective of this study is to conduct a competitive analysis of ICT subsectors in Lebanon, in order to identify which subsectors Lebanon could have a higher potential to thrive in. This exercise could serve as a basis for the direction of resources and incentives to the subsectors that have displayed the strongest competitive advantages.

The study covers the following ICT subsectors: ad tech, consumer Internet, e-commerce, e-government, e-learning, financial and e-payment solutions, enterprise software, gaming, healthcare and biotech, infrastructure, media streaming, semiconductors, small hardware products, telecom services, telemarketing and call centers, and value-added services. Due to the small size of the Lebanese market, the study encompasses the entire Middle East and North Africa region.

The report is divided into four sections:

- Section 1 is an overview of the global and regional market trends in ICT.
- Section 2 outlines the factors that enable the success of the various subsectors. Factors considered are education and skills, infrastructure, legal framework, capital, and synergies with other markets and industries.
- Section 3 presents Lebanon’s current capabilities along several key dimensions, including the enabling factors listed in Section 2.
- The paper culminates in Section 4 with recommendations regarding the strategic ICT subsectors that could provide Lebanon with a competitive advantage.

This study was authored by the Investment Development Authority of Lebanon (IDAL) and Lebanon for Entrepreneurs (LFE), in collaboration with Middle East Venture Partners (MEVP) and senior staff from the Ministry of Telecommunications (MoT) and the Office of the Presidency of the Council of Ministers (OPCM). While several prior reports have addressed the competitiveness of various Lebanese industry sectors relative to each other, the present study is the first to analyze the Lebanese ICT sector with a high degree of granularity.

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1. Global and Regional (MENA) Market Trends in ICT

Worldwide IT spending was on track to reach USD 3.7 trillion in 2014, a 2.1% increase from 2013.¹⁰

Globally, the enterprise software market will be the fastest-growing segment: it is expected to grow to USD 344 billion by the end of 2015, a 7.3% increase from 2014 (Table 2).

Table 2: Worldwide IT Spending Forecast (USD billion)

	2013		2014		2015	
	Spending	Growth	Spending	Growth	Spending	Growth
Devices	677	1.1%	685	1.2%	725	5.8%
Data Center Systems	140	-0.1%	140	0.4%	144	2.9%
Enterprise Software	300	5.1%	321	6.9%	344	7.3%
IT Services	932	0.0%	967	3.8%	1,007	4.1%
Telecom Services	1,624	-1.2%	1,635	0.7%	1,668	2.0%
Overall IT	3,673	0%	3,749	2.1%	3,888	3.7%

Source: Gartner, June 2014

The MENA region is an active player in ICT: the region's ICT spending stood at USD 211 billion in 2014, an 8% increase from 2013 (Table 3). It is projected to reach USD 242.8 billion by 2018, accounting for 5.6% of worldwide ICT spending. This increase can be attributed to smart government, big data, and increased investments in vertical markets.¹¹ Communications, media and services, banking and securities, and healthcare will observe the highest spending growth rates: 6.1%, 5.3%, and 4.5%, respectively.¹²

The growth of MENA's ICT market is compounded by a rapidly developing Internet market: the number of Internet users in the Arab world is expected to reach 197 million by 2017¹³.

Table 3: MENA's ICT Spending Estimates (USD billion)

	2013	2014	2015	2016	2017	2018
Devices	30.0	37.2	41.3	47.4	50.5	56.5
Data Center Systems	3.7	3.8	3.9	3.9	4.0	4.0
Enterprise Software	4.0	4.5	4.9	5.3	5.8	6.3
IT Services	8.7	9.3	9.7	10.1	10.5	11.0
Telecom Services	149.2	156.4	160.1	162.6	164.1	165.0
Overall IT	195.6	211.1	219.8	229.2	235.0	242.8

Source: Gartner, March 2014¹⁴

As seen in Table 3, the telecom services sector benefited from the highest share of spending in 2014 (74%), followed by devices and IT services. In terms of growth, the devices market is expected to grow at a CAGR of 13.5% - the highest over the period 2013-2018¹⁵ - while enterprise software will come second with a CAGR of 9.5%. Conversely, data center systems will have the lowest CAGR (1.6%) over the forecast period.¹⁶

Ad Tech

In 2013, the Internet advertising market was worth USD 117.2 billion.¹⁷ This figure is expected to increase to USD 194.5 billion by 2018, growing at a 10.7% CAGR.¹⁸ The major trends in ad tech are the following:¹⁹

- **Mobile will become the third-largest Internet advertising platform:** global mobile Internet advertising revenue is forecast to leapfrog classified advertising and become the third-largest Internet advertising channel, reaching USD 37 billion by 2018.
- **Search will remain dominant:** global paid search Internet advertising has the largest share of total Internet advertising revenue. Its market size was estimated at USD 48.4 billion in 2013, and is expected to hit USD 73.8 billion in 2018.
- **Video will witness the sharpest growth:** global video Internet advertising revenue is expected to rise at a 23.8% CAGR until 2018, ahead of mobile (21.5%).

Marketing in the **MENA** region is still highly traditional, relying mainly on direct mail, newspaper advertising, and live events. Nevertheless, new channels such as email and social media marketing are gaining momentum.²⁰ Digital advertising grew by more than 45% in 2013, and was worth USD 1.35 billion in 2014.²¹ Online advertising spending in MENA amounted to USD 300 million in 2013, and is currently growing by 37% per year, on track to reach USD 1 billion by 2017.²²

Consumer Internet

Web and Mobile Portals, Content Websites and Apps, News, and Internet Publishing:

17.4% of **global** Web traffic today comes from mobile, compared to 11.1% in 2012. As more and more people get access to the Internet through their mobile devices, demand for mobile-optimized content will increase. App revenues are expected to reach USD 92 billion in 2018. The most popular app store categories in March 2014 were games (18.3%), education (10.5%), business (8.2%) and lifestyle (8.1%).

In MENA, the first Arabic top-level domain name, transcribed in English as “shabaka”, was approved for use in March 2013 by the Internet Corporation for Assigned Names and Numbers (ICANN).

Shabaka became generally available in February 2014, in hopes that it would stimulate a new phase for Arabic content online.

Social Networks and Apps: Globally, consumers continue to spend more time on social networks than on any other category of sites: roughly 20% of their total time online via personal computer, and 30% of their total time online via mobile. Between March 2013 and March 2014, the messaging app market exploded, with the top seven messaging apps growing by 148% and adding 900 million users.

In the **MENA** region, around 65% of Internet users were using social networking sites in 2014. More than 36,000 new Facebook accounts are created every day in MENA, and 85.6% of social media users, 54.5% of Internet users, and 13.4% of the total population were estimated to use Facebook in 2014.

Search: The **global** search market is worth more than USD 16 billion, and is dominated by the big 5 search engines: Google, Baidu, Yahoo, Yandex, and Bing.²³ Two trends are picking up in this market: semantic search and online audience optimization, which many experts believe will replace SEO. In the Arab world, search is growing at around 25% each year.²⁴

Search engine marketing is used frequently by marketers, with 56% of companies **in the Middle East** using SEO and 35% using Pay per Click.²⁵

E-Commerce

The **worldwide** e-commerce market is forecast to grow at a CAGR of 13.54% over the period 2013-2018.²⁶ Business-to-Consumer e-commerce sales reached an estimated USD 1.5 trillion in 2014.²⁷ Global online retail sales will account for 16.6% of total retail sales by 2020, implying that one out of every 10 retail transactions will be online.

According to the *“PayPal Insights: E-Commerce in the Middle East 2012-2015”* report, 30 million people are currently shopping online **in the Middle East**, up 65% from 2011.²⁸ In the MENA region, online sales account for less than 1% of total retail sales, but are expected to grow at a fast pace. E-commerce sales were USD 11.2 billion in 2013 and are set to reach USD 15 billion by 2015, and a significant amount of that spending will be due to mobile commerce. In 2011, mobile transactions made up 10% of e-commerce (similar rate compared to the rest of the world), and they are expected to reach 20% by the end of 2015. Cash on delivery is the predominant payment method, making up roughly 70% to 80% of all transactions. Although e-commerce penetration varies across different countries of the region, it remains fairly low overall. The top consumers in the Middle East are located in the UAE, with Dubai leading the way.

E-Government

Globally, e-government spending is set to increase from USD 28 billion in 2010 to USD 57 billion in 2016, with the number of users tripling over the same period.²⁹ In addition, as many as 35% of government shared-service organizations will be managed by private sector companies.³⁰

In MENA, governments across the GCC are building their e-government services in order to meet the demands of their constituents. The GCC's E-Government Development Index is growing at twice the rate of the global average, and the GCC may overtake Europe as the leading provider of e-government services by 2015.³¹ E-government initiatives include the UAE's *Government Portal* and Dubai's *Smart Government*, Saudi Arabia's *Yesser*, Qatar's *Hukoomi*, Oman's *Omanuna*, Kuwait's *Kuwait Government Portal*, and Bahrain's *eGovernment Portal*.³²

E-Learning

The **global** e-learning market is expected to grow at a CAGR of 25.8% over the period 2013-2018.³³ The e-learning market size **in MENA** was estimated at USD 443 million in 2013, and is expected to reach USD 560.7 million by 2016, with an annual growth rate of 8.2%. Oman has the highest growth rate for e-learning (19.6%), followed by Lebanon (16.0%), Turkey (12.9%), Kuwait (12.6%), and Qatar (11.3%).³⁴ The GCC's share of the MENA e-learning market is expected to hit 71% by 2016, amounting to USD 378.4 million.³⁵

According to Deloitte, student registrations in Massive Open Online Courses (MOOCs) in the Middle East were on track to rise by 100% between 2012 and 2014, reaching over 10 million courses in 2014. Continuing education and enterprise training are the fastest adopters of MOOCs, with significant growth in 2014 and 2015. The higher education market and the corporate skills development market have the biggest share, with USD 400 billion and USD 130 billion per year, respectively. MOOCs look promising and are anticipated to be a major factor by 2020, representing over 10% of all courses taken in higher education and enterprise continuing education.³⁶

Financial and E-Payment Solutions

Worldwide, the mobile payment market is forecast to reach over 450 million users, and record transactions worth more than USD 721 billion in 2017. This represents CAGRs of 18% and 35%, respectively, for the period 2012-2017.³⁷

The MENA region's share of this market is minimal, but it is expected to grow at a CAGR of 80% through 2017, when transactions are forecast to hit USD 27.6 billion. Almost 90% of these

transactions will be remittances from expats. Bank account and credit card penetration exceed 70% in most of the GCC, and large immigrant populations are spurring mobile payment transactions.³⁸

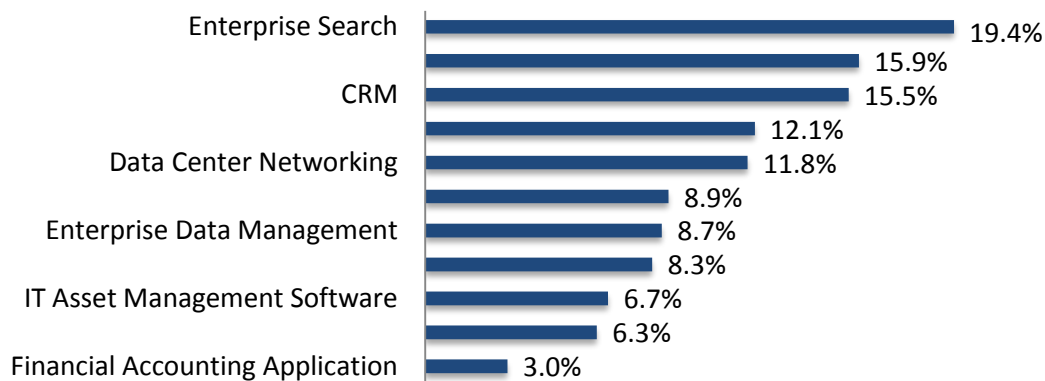
Mobile money is gaining popularity in some **MENA** countries. At the end of 2013, deployments in MENA represented 6% of the live mobile money services globally and 13% of total planned services, indicating that the region will become increasingly important for the industry globally.³⁹

Online banking in the GCC has not yet reached maturity. Only a third of all GCC banking customers have signed up for online services, and only 18% of total customers are active online.⁴⁰ However, the number of mobile banking users in MENA is expected to jump from 19.8 million in 2013 to 82.1 million users by 2017.⁴¹

Enterprise Software

Worldwide spending on enterprise software has reached USD 296.6 billion in 2013, accounting for around 8% of IT spending.⁴² Spending on enterprise software grew at a CAGR of 6.9% until 2013, and is expected to grow 8.2% through 2018. The fastest-growing subsectors within this segment are enterprise search, business process management, and customer relationship management (Figure 2).

Figure 2: Projected Global CAGR of Different Categories in Enterprise Software (2013-2018)



Sources: Gartner, MarketsandMarkets, MicroMarketMonitor, ReportsnReports, ResearchandMarkets, Sandler Research, TechNavio.

In the MENA region, the market for enterprise software is expected to grow at a CAGR of 10% from 2012 to 2015, fueled by spending on database management systems, operating systems, and enterprise resource planning.

CRM is expected to contribute 30% of all spending on enterprise software in the MENA region through 2018. In addition, the data center market is expected to grow at a CAGR of 10.55% over the period 2013-2018. Table 4 displays details on enterprise IT spending by vertical market in the Middle East and Africa.

Table 4: Enterprise IT Spending by Vertical Market in MEA (Billions of Euros)

	2011	2012	2013e	2014e	2015e	2011-2015 CAGR
Banking and Securities	11,849	12,721	13,338	13,932	14,590	5.3
Communications, Media and Services	9,718	10,415	11,045	11,620	12,303	6.1
Education	1,878	1,998	2,075	2,142	2,218	4.2
Government	12,371	13,130	13,638	14,119	14,666	4.3
Healthcare	3,037	3,261	3,404	3,512	3,615	4.5
Insurance	4,148	4,438	4,607	4,746	4,906	4.3
Manufacturing and Natural Resources	10,834	11,266	11,643	11,904	12,208	3.0
Retail	3,127	3,261	3,328	3,425	3,540	3.1
Transportation	3,255	3,500	3,642	3,743	3,858	4.3
Utilities	3,906	4,178	4,328	4,459	4,583	4.1
Wholesale Trade	1,549	1,658	1,707	1,763	1,812	4.0
Total	65,672	69,826	72,755	75,365	78,299	4.5

Source: Gartner, 2012⁴³

Gaming

The estimated **global** CAGR for gaming is 8.9% for the period 2013-2017. In 2013, mobile gaming accounted for 23% of the global gaming market, and is forecast to reach 34% (USD 35 billion) by 2017.⁴⁴ The number of gamers worldwide is expected to reach 1.55 billion by 2016.⁴⁵

In the Middle East, digital game sales are set to rise at a CAGR of 29% to reach USD 3.2 billion in 2016⁴⁶, driven mainly by a young population. Indeed, about 60% of the 365 million people in the Arab world are younger than 25, and the number of Internet users in the region stands at about 70 million, a growth of over 300% in the last five years.⁴⁷

Healthcare and Biotech

Healthcare IT and E-Health- The **global** Healthcare IT market is forecast to grow at a CAGR of 5.7% for the period 2013-2018. The healthcare market **in the MENA region** is expected to grow at a CAGR of 6.6% to reach USD 144 billion by 2020, up from USD 81.1 billion in 2011⁴⁸.

The market for outpatient visits in the GCC is estimated at 115 million visits annually, with a value of USD 7 billion⁴⁹ and a projected growth of over 11%⁵⁰. E-visits in the GCC account for around USD 2-3 billion of that market.⁵¹

Medical Devices- The **global** market for medical devices is expected to grow at a CAGR of 4.46% over the period 2014-2018. In vitro diagnostics will be the industry's top segment by 2018, with sales of USD 54.5 billion. Neurology devices will post the fastest growth, expanding by 6.1% per year to reach USD 7.3 billion by 2018.

The MENA market for medical devices is expanding rapidly, driven by population growth, urbanization, and increased government investments in healthcare. The market is expected to double to 6% of GDP by 2018⁵².

Biotech- The **global** biotechnology market size was estimated at USD 289 billion in 2014⁵³, and is expected to grow at a CAGR of 12.3% from 2014 to 2020⁵⁴. Biotechnology products represented 21% of the global market for prescription drugs in 2012, a number that is expected to grow to 25% by 2018⁵⁵. The global biotechnology industry continues to be populated by many small companies, alongside a few giant pharmaceutical, chemical, and agricultural firms.

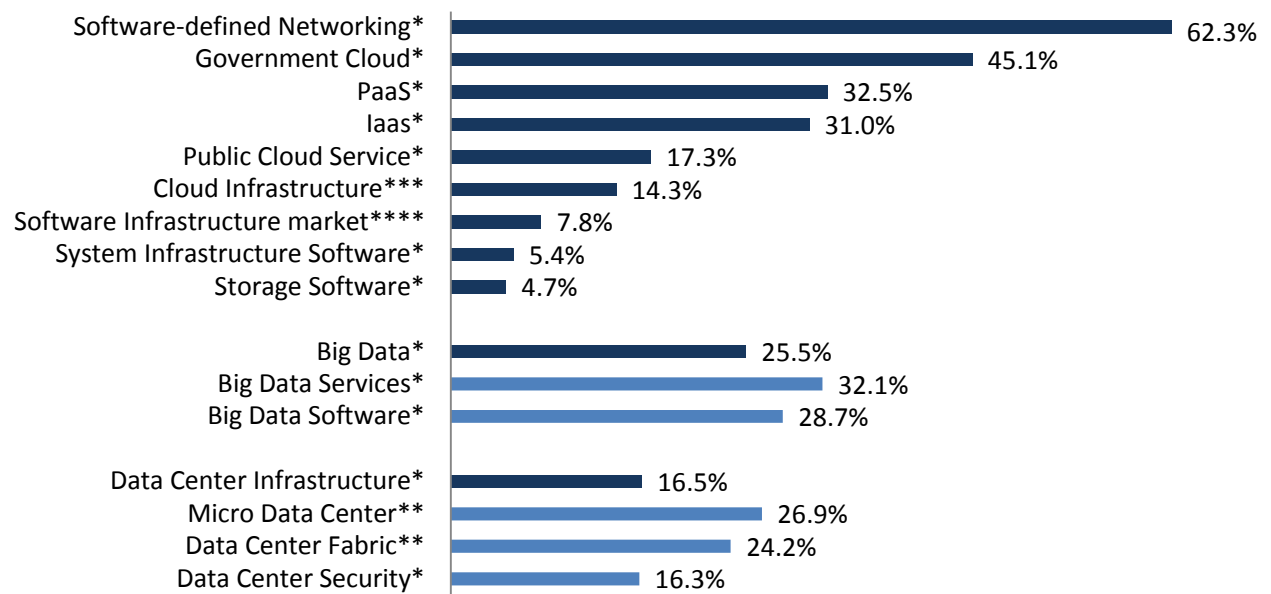
The MENA region is becoming an attractive hub for multinational biotech companies that are looking for opportunities, due to the rise in chronic diseases and the availability of incentives put in place by Arab governments to spur the development of the biotech industry.⁵⁶ Aside from specialized biotech companies such as Amgen and Genzyme, many of the major pharmaceutical companies such as Roche, Novartis, Pfizer and GlaxoSmithKline manufacture and sell biotech products in the Middle East.

Many Arab governments have created incentives to spur the development of the biotechnology industry.⁵⁷ Between 2010 and 2012, Saudi Arabia spent USD 93 million on biotech projects. Dubai established the first biotechnology free zone in the world (Dubiotech) to attract biotech leaders and encourage investments in the field, and Abu Dhabi University is host to the first biotech incubator in the UAE. Jordan also established the Princess Haya Biotechnology Center. However, MENA's political instability and poor regulatory framework in key markets will cause it to lag behind other regions such as Latin America and Asia when it comes to foreign direct investment in biotech.⁵⁸

Infrastructure

The **global** software infrastructure market is expected to grow at a CAGR of 7.8% for the 2014-2018 period.⁵⁹ In particular, the market for operating systems is expected to hit USD 60.5 billion by 2018, accounting for the largest proportion of the software infrastructure market.⁶⁰ Software-defined networking is expected to grow at a CAGR of 62.3% between 2013 and 2018, making it the fastest-growing segment.⁶¹ Other noticeable segments are government cloud, PaaS, and big data services, with CAGRs of 45.1%, 32.5%, and 32.1%, respectively, for the period 2013-2018.⁶² Figure 3 summarizes the growth trends of the main software infrastructure subcategories.

Figure 3: Projected Global CAGR of Different Categories in the Infrastructure Subsector



*CAGR for 2013-2018

**CAGR for 2014-2019

***CAGR for 2013-2017

****CAGR for 2014-2018

Sources: Gartner, IDC, Kable, Sandler Research, MarketsandMarkets, Forbes, ReportsnReports, TechNavio, United Nations Conference on Trade and Development.⁶³

In the MENA region, spending on application infrastructure and middleware is becoming increasingly significant, with private cloud, security, mobility, and data center modernization representing the key drivers in infrastructure spending.

From 2014 to 2018, USD 4.7 billion will be spent on cloud services in the MENA region. The public cloud services market in MENA is on track to reach USD 620 million in 2018, up from an estimated USD 511 million in 2013. The Platform as a Service (PaaS) market will surpass USD 46 million by 2016. Infrastructure-as-a-service (IaaS) is expected to grow from USD 60 million in 2013 to USD 170 million in 2018.

The data center market in the Middle East is fueled by increased construction of Tier 3 and Tier 4 data centers by multinational corporations and regional hosting service providers, especially in Saudi Arabia and the UAE. The data center infrastructure support services market is expected to grow at an 11.23% CAGR through 2018. Servers are the largest segment of the IT infrastructure market, with revenues of USD 1.54 billion in 2013, on track to reach USD 1.69 billion in 2016.

Media Streaming

Global digital music streaming revenues will grow at a 13.4% CAGR, and electronic home video OTT/streaming will witness a 28.1% growth, rising globally from USD 6.6 billion in 2013 to USD 22.7 billion by 2018.⁶⁴

Online music revenues **in MENA** are expected to grow sharply at a CAGR of 60%, reaching USD 33 million in 2014.⁶⁵ At present, the Arab music streaming market is estimated at USD 1.1 billion.⁶⁶ As for video streaming, YouTube statistics place MENA the second-highest regional consumer worldwide, with 285 million videos viewed every day and two hours of video uploaded every minute.⁶⁷ Video is expected to account for more than two-thirds of all mobile traffic in 2016.

Semiconductors

Global semiconductor revenues are expected to log a CAGR of 3.4% between 2013 to 2018, reaching USD 384 billion in 2018.

In the MENA region, Abu Dhabi has made significant investments as part of its vision to become a major player in the global chip making market. State-owned Mubadala Technology (formerly ATIC) is building an advanced technology cluster to manufacture semiconductors and attract other semiconductor companies into the region. In 2009, ATIC invested USD 1.4 billion in partnership with US company Advanced Micro Devices (AMD) to create a manufacturing division, GlobalFoundries. In 2010, ATIC paid USD 1.8 billion for a majority stake in Chartered Semiconductor of Singapore, which elevated GlobalFoundries to the third-largest contract chip maker in the world.

Small Hardware Products

The **global** IT hardware market is expected to grow at a CAGR of 6.1% from 2014 to 2018. Despite increasing sales of computers over the past five years, falling computer prices have been impeding revenue growth for the industry. In addition, firms have had to face rising competition from tablets. Indeed, the number of PCs will fall from 28.7% of devices sold in 2013 to 13% in 2017. The proportion of tablets sold will increase from 11.8% in 2013 to 16.5% by 2017, and that of smartphones will increase from 59.5% to 70.5%. The industry is expanding to emerging markets, where rising disposable incomes are boosting demand for computers and hardware.

The hardware industry has low market share concentration, with the top four players accounting for less than 30% of total revenues. However, market share concentrations within the industry vary by region. Some niche manufacturers of hardware and peripherals such as disk drives and printers exhibit higher degrees of concentration than the overall industry.

The hardware market in **MENA** is largely driven by increased consumer spending on personal computers, as well as by corporate and government investments dedicated to the expansion of existing infrastructure and systems. While some small- and medium-size businesses are capturing a share of the PC market, the broader hardware market remains dominated by international players such as IBM, Cisco, Sun Microsystems, HP, and Siemens.

In **Lebanon**, opportunities are now emerging in the manufacturing and design of hardware components. While some progress has been made, the local hardware industry is still in its infancy and is concentrated on specific activities and products. Activities include systems concepts and infrastructure software, semiconductor design, design and production of circuit boards, fiber optic cables, electronic components, and power supply systems.

Telecom Services

The **global** telecommunications services market is expected to reach USD 1.8 trillion in 2017, with a CAGR of 3.8%. 66% of global revenue growth will come from emerging Asia-Pacific countries, and three countries will account for about 60% of global revenue growth: China (40%), India (12%), and Brazil (8%). Enterprise and governmental users are key customer segments for telecommunications service providers.

In the **MENA** region, the telecom services market is expected to grow at a 2.9% CAGR to reach USD 96 billion by 2018. Mobile data and fixed broadband will post the highest growth, driven by increasing smartphone penetration and Internet demand. The fastest growth area will be mobile data services, with handset data revenues set to grow at a CAGR of 17.9% between 2012 and 2017. By 2016, the MENA region will overtake Europe as the second-largest region for mobile subscribers.

Telemarketing and Call Centers

The **global** telemarketing industry is growing at an annual average of 6.5% to 8%, due to businesses becoming increasingly aware of the need for market information and the desire to reduce customer turnover rates. The telemarketing industry is fragmented, with companies varying greatly in size, scope, services offered, and market share.

Value-Added Services

The **global** mobile VAS market is expected to grow at a CAGR of 10.67% over the period 2012-2016.

The Middle East has played a key role in growth of the global mobile VAS market, which is estimated to have expanded from USD 200 billion in 2009 to USD 340 billion in 2014.⁶⁸ By 2018, Cisco expects

nearly 5 billion mobile users with over 10 billion mobile devices or connections, faster network speeds, and smarter devices, to drive mobile video to 69% of the overall mobile data traffic globally.⁶⁹ In terms of regional mobile data traffic growth rates, the Middle East and Africa will witness a 70% CAGR and a 14-fold growth from 2013 to 2018.⁷⁰

Software as a Service

SaaS is not included in the list of subsectors because it is a delivery mechanism. However, its use in several subsectors makes it indispensable to the study.

A cloud consists of large farms of inexpensive servers distributed over several locations. SaaS should be viewed as a new business model for the delivery of services through the cloud. Its features are resource outsourcing, utility computing, automated resource management, virtualization, parallel computing, data access control, and service level agreements.

In the Middle East, the SaaS market size is expected to hit USD 307 million in 2018.⁷¹ From 2012-2017, MEA is expected to have the highest cloud traffic growth rate, with a CAGR of 57%.

Table 5: Cloud Traffic Growth and Workload Distribution in MENA

	2012	2013	2014	2015	2016	2017	CAGR 2012-17
Cloud Traffic Growth	17.0	31.0	51.0	77.0	112.0	157.0	57%
Total Data Center Workloads (millions)	1.4	1.8	2.4	3.1	3.9	4.8	27%
Cloud Data Center Workloads (millions)	0.4	0.7	1.1	1.6	2.2	2.9	45%
Traditional Data Center Workloads (millions)	1.0	1.1	1.3	1.5	1.7	1.9	13%

*Source: Cisco Analysis, 2013*⁷²

From 2014 through 2018, a total of USD 4.7 billion will be spent on public cloud services in the MENA region.⁷³ The market in the MENA region is predicted to exhibit high growth, and IT spending on public cloud services in the region is expected to reach USD 1.1 billion in 2017.⁷⁴

2. Enabling Factors for ICT Subsectors

This section identifies the requirements in education and skills, infrastructure, legal framework, capital, and synergies with other markets and industries that are needed for the various subsectors to flourish.

Education and Skills

The education and skills required vary by subsector. Many subsectors require a degree in engineering and computer science, and there is high demand for business administration backgrounds, but some subsectors require additional, more specialized skills. For instance, the healthcare subsector requires a medical or medical engineering background, and the e-learning subsector requires experience in education and curriculum planning. Appendix B lists the required educational backgrounds and skills for each subsector.

Infrastructure

Most subsectors require a download speed of at least 750 Kbps, and some such as infrastructure and healthcare IT require a download speed of at least 2.5 Mbps. Upload speed requirements are usually lower: most subsectors require an upload speed of at least 250 Kbps, and some such as e-learning, e-health, and healthcare IT require an upload speed of at least 1.5 Mbps. The maximum allowable latency for all subsectors is 160 milliseconds. These requirements for speed and latency are the strict minima to enable software products to run, but must be typically exceeded to ensure a smooth customer experience.

Hardware-based products do not call for minimum download or upload speeds, but do have other infrastructural requirements. Small hardware products, for instance, require the availability of raw materials, the reshipping of manufactured products, access to laboratories and manufacturing facilities, and access to cheap parts. Biotechnology and medical devices require R&D and advanced technologies, while the manufacturing of semiconductors requires clean water and reliable electricity. Finally, telemarketing and call centers need a physical infrastructure, media and telecom services, and logistics support (warehousing, storage). Appendix C lists the infrastructure requirements for each ICT subsector, including latency, download speed, and upload speed.

Legal Framework

While the supporting laws and regulations differ for each subsector, some laws such as privacy and data protection are important for a large number of subsectors. Subsectors such as gaming and e-commerce require a robust e-payment regulatory framework, while e-commerce and small hardware products require a strong import/export regulatory framework.

Capital

Table 6 indicates the amount of investment (high, medium, or low) needed for a startup in a given subsector to bring its first product or service to market. High refers to any amount above USD 1 million, medium ranges between USD 100,000 and USD 1 million, and low refers to a capital requirement below USD 100,000. Ranges are applicable to Lebanon, with labor cost being the main variant with other countries.

Table 6: Capital Requirements for Each ICT Subsector

Subsector	Capital Required
Enterprise Software	High
Infrastructure	High
Financial and E-Payment Solutions	Medium
E-Commerce	High
Web and Mobile Portals, Content Websites and Apps, News, Internet publishing	Low
Social Networks and Apps	Medium
Search	Medium
Ad Tech	Low
Media Streaming	Medium
Gaming	Low
E-Learning	Medium to high
E-Government	High
E-Health	Low
Healthcare IT	High
Medical Devices	High
Biotechnology	High
Semiconductors	High
Small Hardware Products	Medium to high
Telecom Services	High
VAS	Medium
Telemarketing and Call Centers	Medium

Sources: Investment Development Authority of Lebanon (IDAL), Lebanon for Entrepreneurs (LFE)

Synergies with Other Markets and Industries

The study also looks at other industries that could enable the various subsectors by virtue of affinity and complementarity. Table 7 displays synergistic industries for each ICT subsector.

Table 7: Synergistic Industries for Each ICT Subsector

Subsector	Synergistic Industries
Enterprise Software	Finance, retail banking, insurance, healthcare, education, retail, transport, hospitality
Infrastructure	Banking, telecom, insurance
Financial and E-Payment Solutions	Retail banking, telecom, offline distribution, commerce
E-Commerce	Offline distribution, e-payments, fashion, publishing
Web and Mobile portals, Content Websites and Apps	Advertising, media, tourism
Social Networks and Apps	Advertising, media
Search	Advertising, travel, fashion, media, publishing
Ad Tech	All
Media Streaming	E-payments, media, news
Gaming	Advertising
E-Learning	Education
E-Government	n/a
E-Health and Healthcare IT	Healthcare
Medical Devices	Manufacturing, healthcare
Biotechnology	Healthcare
Semiconductors	Manufacturing
Small Hardware Products	Semiconductors, manufacturing
Telecom Services	Media
VAS	Media, advertising
Telemarketing and Call Centers	Outsourcing

Sources: Investment Development Authority of Lebanon (IDAL), Lebanon for Entrepreneurs (LFE)

3. Current State of ICT in Lebanon

ICT subsectors in Lebanon are assessed along the following dimensions: education and skills, infrastructure, legal framework, capital availability, and potential synergies with other industries. Other factors such as the sophistication of local and regional customers, the intensity of local and regional competition, the ease of export and import, and the resilience of the subsectors to instability in Lebanon are also considered.

Education and Skills

As shown in Appendix D, Lebanon ranks 28th worldwide for the quality of its educational system, and fifth for the quality of math and science education. According to the 2014 Global Innovation Index, Lebanon ranks seventh in education among the top 10 middle-income countries.⁷⁵ Lebanon boasts skilled graduates in most majors, but lags behind in the field of biotechnology.

Between 2010 and 2014, there were 34,277 graduates in business, the highest of all majors. Moreover, engineering and IT, medical and health studies, and media, advertising, and marketing have a high number of graduates: 15,002, 8,538 and 5,489, respectively. Appendix E displays the number of Lebanese graduates in each major for the 2010-2014 period.

In terms of employment, companies engaged in the creation of software products and services employ a total of around 5000 highly skilled individuals, with demand for ICT skills increasing significantly every year.⁷⁶ Around 200 companies are engaged in the production of software products and services – mostly small- and medium-sized businesses involved in software development, Web solutions, and mobile services and applications⁷⁷.

Research and Development

The latest estimation of R&D personnel and expenditures dates from 2006, when 750 researchers were active with an estimated budget of USD 55 million.⁷⁸ This is equal to 0.22% of Lebanon's GDP that year, a percentage comparable to the regional average (0.2%) but well below international standards. The OECD average stands at 2.3%⁷⁹, the average of all EU-28 countries is 2.06%⁸⁰, and the United States' GERD was last measured in 2011 by the World Bank to be 2.76%.⁸¹

Infrastructure

Despite some improvements to Lebanon's ICT infrastructure, it still lags far behind on the global map. Fixed-line download and upload speeds are abysmal by international standards, and Lebanon

ranks consistently at the bottom of worldwide Internet statistics. Indeed, Lebanon’s average download and upload speeds are at 3.9 Mbps and 1.8 Mbps, respectively, in comparison to global Internet average speeds of 23.4 Mbps (download) and 10.7 Mbps (upload)⁸². For mobile, the global average download/upload speeds are 11.4 Mbps/2.3 Mbps. According to Cisco, the combined average download speed of mobile and fixed networks in Lebanon is around 4.82 Mbps, and the average upload speed is 1.23 Mbps (Table 8).⁸³ As for other crucial broadband indicators, Lebanon also fails to deliver properly: the average latency is above 100 milliseconds, and average jitter is between 30 and 100 milliseconds. These factors hinder the development of many ICT subsectors.

Table 8: Lebanon's Broadband According to Cisco, 2013

	Avg. DL (Kbps)	Median DL (Kbps)	Avg. UL (Kbps)	Median UL (Kbps)	Avg. Latency (ms)	Median Latency (ms)
Overall* Fixed Networks	2,147	1,217	713	335	240	165
Consumer Fixed Network	1,760	1,217	713	335	240	165
Overall* Mobile Networks	7,500	4,483	1,747	1,007	87	49
Consumer Mobile Network	7,500	4,483	1,747	1,007	87	49

**Overall covers Consumer and Business Networks
Source: Cisco Global Cloud Index⁸⁴*

In 2014, Lebanon's fixed broadband penetration rate was 22.8 subscriptions per 100 inhabitants, higher than the global average of 10.3%, developing economies' average of 6.6%, and the Arab world’s average of 3.4% (Table 9).

Table 9: Fixed Broadband Subscriptions in Lebanon (2011-2014)

	2011	2012	2013	2014
Total	402,329	476,185	480,000	1,132,139
Percentage	8.98	10.25	9.95	22.80

Source: International Telecommunication Union (ITU) Statistics, 2014⁸⁵

In 2014, Lebanon had 74.7 Internet users (on fixed and mobile networks) per 100 inhabitants, up from 61.25% in 2012.⁸⁶ Lebanon’s Internet penetration rate is above the global average of 40.6%, the Arab average of 34.7%, and developing economies’ average of 32.4%⁸⁷.

Legal Framework

A strong legal framework enables the development of the ICT sector by encouraging entrepreneurs to create tech startups, and attracting local and foreign investors to the sector. While some favorable laws and regulations have been enacted in Lebanon during the past 20 years, many remain on hold or are poorly implemented:

Laws recently passed

- The enactment of Law 247/2014 ***gives the government the right to legislate in the field of customs***. Given the lengthy process of legislation in parliament, the law is good news for ICT companies that rely on export and import (e.g., small hardware products, e-commerce, and semiconductors).
- Closely related is the enactment of Law 248/2014, which ***exempts the profits of industrial exports of Lebanese origin of 50% of the tax due***. Again, the law is a positive development for ICT companies that export from Lebanon (e.g., small hardware products, e-commerce, semiconductors, medical devices, and any software companies that do not sell over the cloud).
- The enactment of Law 6/2014 (***“accept USD 30 million World Bank loan to encourage investments in innovative companies”***) has resulted in the creation of a fund (“iSME”) with USD 25 million allocated for equity co-investments and USD 5 million for concept development grants. Entrepreneurs in all ICT subsectors may benefit.

Laws not implemented

- The implementation of ***Telecommunications Law 431*** (passed in 2002) has been blocked by the vested interests of politicians and incumbent telecom operators. The Telecom Regulatory Authority (TRA) was created in 2007 upon the enactment of Law 431, which confers upon the TRA the responsibility to regulate the telecom market in Lebanon according to a policy set forth by the Ministry of Telecommunications. The TRA is therefore, mandated to protect consumers, analyze the market, and take any necessary action to promote competition. However, the TRA has lost its mandate and powers to the Ministry of Telecom, which is currently regulating service providers, spectrum allocation, mobile operators, and all other telecom matters.
- The draft law to ***accept a USD 6.4 million World Bank loan to foster the mobile Internet ecosystem*** has failed to pass because Parliament did not convene, and the loan was rescinded by the World Bank in 2015 after multiple deadlines had passed. The purpose of the project was to foster innovation, talent creation, and entrepreneurship in the mobile Internet space, increasing activity in subsectors such as gaming and mobile apps.

Laws pending

- The ***Electronic Transactions and Protection of Personal Data*** law encompasses e-signatures, e-commerce, e-services, .lb domain names, the protection of online personal data, and

electronic crimes. Its newest version was transferred to Parliament in 2012, and it is still under discussion. This law is crucial for subsectors such as e-commerce and financial and e-payment solutions, and it also affects subsectors that involve the storage of online personal data (e.g., e-health and healthcare IT, social networks and apps, search, and e-government)

- The ***Freedom of Information*** draft law has been under discussion in Parliament since 2012. Its goal is to improve transparency and reduce corruption in government-related transactions. Directly affected by this law is the e-government subsector.
- The ***Preferred Shares*** draft law is still being discussed in Parliament. If passed, the law would attract equity investors to all subsectors by allowing Lebanese companies to issue preferred shares.
- The draft law to ***amend some chapters and articles of the Commercial Code*** is still being discussed in Parliament. Its purpose is to allow the creation of one-person companies, to reduce the burden of administrative procedures related to the creation and operation of companies, and to allow company registration electronically. If passed, it would benefit companies in all subsectors.
- The draft law for ***Secured Lending*** still has not made it to the Council of Ministers' agenda. Its purpose is to facilitate lending against movable collateral, making it easier for companies in all subsectors to borrow money.
- Several draft laws related to ***Intellectual Property (IP)*** are pending Parliament's review. These laws would bring Lebanon in compliance with global treaties regarding the protection and distribution of works and the rights of their authors in the digital environment.
- Laws for ***Bankruptcy, Private Equity Funds, and Equity Compensation*** are currently being drafted under the supervision of the Presidency of the Council of Ministers and Lebanon for Entrepreneurs (LFE). They affect all ICT subsectors equally.

Capital

Lebanon has an active startup environment, marked by the proliferation of clusters, incubators, accelerators, funds, and development initiatives, and the emergence of a number of promising Lebanese startups going global. Financial support for the sector is gaining momentum: in 2013, the Lebanese Central Bank issued Circular No. 331, through which over USD 400 million were made available for commercial banks to invest as equity in Lebanese startups, incubators, accelerators, and venture capital funds. International institutions are also earmarking funds for startups, as witnessed by the World Bank's *ISME* program that provides USD 25 million for equity co-investments and USD 5 million for concept development grants⁸⁸.

Synergies with Other Markets and Industries

The majority of subsectors have a high degree of synergy with other sectors and industries in the Lebanese economy. For instance, the financial and e-payment solutions subsector has strong affinity with retail banking, e-learning is tightly correlated with education, and e-health can benefit from Lebanon's developed healthcare sector. Other subsectors such as semiconductors, small hardware products, and medical devices have scored low on this indicator due to the lack of specialized manufacturing in Lebanon.

Sophistication of Local and Regional Customers

The sophistication of local and regional customers refers to the experience and understanding of ICT buyers in Lebanon and MENA, and is a qualitative assessment (high, medium, or low) based on desk research and interviews. Customer sophistication is important because it leads to improved product quality.

Most subsectors have scored "high" or "medium" on the sophistication of local and regional customers, except for e-government, medical devices, semiconductors, and telemarketing and call centers (Appendix F).

Intensity of Local and Regional Competition

The intensity of local and regional competition refers to the degree of rivalry among firms, market concentration, and quality of products and services in the subsectors in Lebanon and MENA. It is measured according to the number of operating firms in the subsectors and their individual market share, and is a qualitative assessment (high, medium, or low) based on desk research and interviews. Competition is important because it leads to improved product quality.

The intensity of local and regional competition is high for most subsectors, except for ad tech, e-learning, e-government, semiconductors, telecom services, and telemarketing and call centers (Appendix F).

Ease of Export and Import

The ease of export and import refers to the availability of an export- and import-friendly environment in Lebanon, and is a binary assessment (yes or no) based on desk research and interviews. Most subsectors have scored high on this indicator, but some that require importing materials and shipping products out of Lebanon (e.g., semiconductors, e-commerce, medical devices, and small hardware products) did not fare well.

Resilience to Instability in Lebanon

This indicator refers to the sensitivity of the subsectors to political instability and insecurity in Lebanon, and is a qualitative assessment (high, medium, or low) based on desk research and interviews.

Most subsectors have a high resilience to instability in Lebanon, with the exception of e-commerce, semiconductors, small hardware products, telecom services, VAS, and telemarketing and call centers (Appendix G).

4. Recommendations

To assess competitiveness, each subsector was assigned a weighted-average score along dimensions listed in Section 3. The distribution of the weights is based on desk research and interviews.

Table 10: Assigned Weights

Factors	Weight (/100)
Education and Skills	20
Infrastructure	20
Legal Framework	15
Synergies with Other Markets and Industries	10
Sophistication of Local and Regional Customers	5
Intensity of Local and Regional Competition	5
Ease of Export/Import	10
Resilience to Security Problems	15

Table 11 displays the detailed scores for each subsector. It is worth noting that subsectors that have received high scores also benefit from favorable global and regional market trends.

Table 4: Detailed Scores of Subsectors

Gaming	Education and Skills	20	95		
	Infrastructure	20			
	Legal Framework	10			
	Synergies with Other Markets and Industries	10			
	Sophistication of Local and Regional Customers	5			
	Intensity of Local and Regional Competition	5			
	Ease of Export/Import	10			
	Resilience to Security Problems	15			
E-Health and Healthcare IT	Education and Skills	20	E-Health	Healthcare IT	
	Infrastructure	20			20
	Legal Framework	10			5
	Synergies with Other Markets and Industries	10			10
	Sophistication of Local and Regional Customers	5			10
	Intensity of Local and Regional Competition	2.5			5
					0
			92.5	50	

	Ease of Export/Import	10		0	
	Resilience to Security Problems	15		0	
Ad Tech	Education and Skills	20	92.5		
	Infrastructure	20			
	Legal Framework	15			
	Synergies with Other Markets and Industries	10			
	Sophistication of Local and Regional Customers	2.5			
	Intensity of Local and Regional Competition	0			
	Ease of Export/Import	10			
	Resilience to Security Problems	15			
Enterprise Software	Education and Skills	20	SaaS 90	20	On-Premise 75
	Infrastructure	10		20	
	Legal Framework	15		15	
	Synergies with Other Markets and Industries	10		10	
	Sophistication of Local and Regional Customers	5		5	
	Intensity of Local and Regional Competition	5		5	
	Ease of Export/Import	10		0	
	Resilience to Security Problems	15		0	
Media Streaming	Education and Skills	20	90		
	Infrastructure	15			
	Legal Framework	10			
	Synergies with Other Markets and Industries	10			
	Sophistication of Local and Regional Customers	5			
	Intensity of Local and Regional Competition	5			
	Ease of Export/Import	10			
	Resilience to Security Problems	15			
Social Networks and Apps	Education and Skills	20	90		
	Infrastructure	15			
	Legal Framework	10			
	Synergies with Other Markets and Industries	10			
	Sophistication of Local and Regional Customers	5			
	Intensity of Local and Regional Competition	5			
	Ease of Export/Import	10			
	Resilience to Security Problems	15			
Web and Mobile Portals, Content Websites and Apps, News, Internet Publishing	Education and Skills	20	87.5		
	Infrastructure	15			
	Legal Framework	10			
	Synergies with Other Markets and Industries	10			
	Sophistication of Local and Regional Customers	2.5			
	Intensity of Local and Regional Competition	5			
	Ease of Export/Import	10			
	Resilience to Security Problems	15			

Search	Education and Skills	20	87.5	
	Infrastructure	15		
	Legal Framework	7.5		
	Synergies with Other Markets and Industries	10		
	Sophistication of Local and Regional Customers	5		
	Intensity of Local and Regional Competition	5		
	Ease of Export/Import	10		
	Resilience to Security Problems	15		
Financial and E-Payment Solutions	Education and Skills	20	82.5	
	Infrastructure	15		
	Legal Framework	7.5		
	Synergies with Other Markets and Industries	10		
	Sophistication of Local and Regional Customers	5		
	Intensity of Local and Regional Competition	5		
	Ease of Export/Import	10		
	Resilience to Security Problems	10		
VAS	Education and Skills	20	77.5	
	Infrastructure	20		
	Legal Framework	10		
	Synergies with Other Markets and Industries	10		
	Sophistication of Local and Regional Customers	5		
	Intensity of Local and Regional Competition	2.5		
	Ease of Export/Import	10		
	Resilience to Security Problems	0		
E-Learning	Education and Skills	20	75	
	Infrastructure	10		
	Legal Framework	15		
	Synergies with Other Markets and Industries	10		
	Sophistication of Local and Regional Customers	2.5		
	Intensity of Local and Regional Competition	0		
	Ease of Export/Import	10		
	Resilience to Security Problems	7.5		
E-Government	Education and Skills	20	70	
	Infrastructure	10		
	Legal Framework	5		
	Synergies with Other Markets and Industries	10		
	Sophistication of Local and Regional Customers	0		
	Intensity of Local and Regional Competition	0		
	Ease of Export/Import	10		
	Resilience to Security Problems	15		
Infrastructure	Education and Skills	20		20
	Infrastructure	0		15

	Legal Framework	10	IaaS, PaaS 70	15	On-Premise 65
	Synergies with Other Markets and Industries	10		10	
	Sophistication of Local and Regional Customers	2.5		2.5	
	Intensity of Local and Regional Competition	2.5		2.5	
	Ease of Export/Import	10		0	
	Resilience to Security Problems	15		0	
Telecom Services	Education and Skills	20	65		
	Infrastructure	10			
	Legal Framework	10			
	Synergies with Other Markets and Industries	10			
	Sophistication of Local and Regional Customers	5			
	Intensity of Local and Regional Competition	0			
	Ease of Export/Import	10			
	Resilience to Security Problems	0			
E-Commerce	Education and Skills	20	57.5		
	Infrastructure	10			
	Legal Framework	7.5			
	Synergies with Other Markets and Industries	10			
	Sophistication of Local and Regional Customers	5			
	Intensity of Local and Regional Competition	5			
	Ease of Export/Import	0			
	Resilience to Security Problems	0			
Small Hardware Products	Education and Skills	20	55		
	Infrastructure	20			
	Legal Framework	10			
	Synergies with Other Markets and Industries	0			
	Sophistication of Local and Regional Customers	2.5			
	Intensity of Local and Regional Competition	2.5			
	Ease of Export/Import	0			
	Resilience to Security Problems	0			
Semiconductors	Education and Skills	20	50		
	Infrastructure	20			
	Legal Framework	10			
	Synergies with Other Markets and Industries	0			
	Sophistication of Local and Regional Customers	0			
	Intensity of Local and Regional Competition	0			
	Ease of Export/Import	0			
	Resilience to Security Problems	0			
Medical Devices	Education and Skills	10	50		
	Infrastructure	20			
	Legal Framework	10			
	Synergies with Other Markets and Industries	5			

	Sophistication of Local and Regional Customers	5	
	Intensity of Local and Regional Competition	0	
	Ease of Export/Import	0	
	Resilience to Security Problems	0	
Biotechnology	Education and Skills	10	45
	Infrastructure	20	
	Legal Framework	5	
	Synergies with Other Markets and Industries	10	
	Sophistication of Local and Regional Customers	0	
	Intensity of Local and Regional Competition	0	
	Ease of Export/Import	0	
	Resilience to Security Problems	0	

Below is an overview of the highest-scoring subsectors (total scores over 80):

Gaming

Gaming obtained a **score of 95**, with all factors scoring high except for legal framework: Parliament's failure to pass the law for the Mobile Internet Ecosystem Project affected the subsector negatively. This high score is in sync with regional market trends: digital game sales are set to rise at a CAGR of 29% to reach USD 3.2 billion in 2016, owing to the very young population of the Arab world.⁸⁹

BIGGEST MARKETS FOR GAMING: There are increased opportunities for gaming on tablets and smartphones; in fact, 78% of the 1.2 billion gamers worldwide play on tablets and smartphones.

- **Tablets:** the sales of computers are falling, while tablet sales are expected to increase from 11.8% of devices shipped in 2013 to 16.5% by 2017. Gaming on tablets is expected to grow at a 48% CAGR to reach USD 10 billion by 2016.
- **Smartphones:** smartphone penetration is increasing, and smartphone sales are set to increase from 59.5% of devices shipped in 2013 to 70.5% by 2017. Opportunities to develop games on smartphones will therefore increase, and gaming on smartphones is expected to grow at an 18.8% CAGR over the period 2012-2016.

E-Health

The e-health market is growing in the Arab world, fueled mainly by increasing demand for healthcare services in the GCC. Expenditure on healthcare services in the GCC hovered at USD 44 billion in 2011, and is projected to grow at around 15% until 2018.

E-health is a competitive subsector for Lebanon, obtaining a **score of 92.5**. The intensity of local and regional competition is average, and the legal framework needs improvement (especially privacy and protection of online data), but all other factors are favorable for the growth of the e-health subsector. ETobb and Sohati are the most well-known e-health portals in Lebanon.

Ad Tech

In the MENA region, spending on digital advertising is on the rise, providing opportunities for entrepreneurs in Lebanon. Ad tech spending in MENA was forecast to expand by 37% (compared to 13% globally) to reach USD 1.35 billion in 2013.⁹⁰ Lebanon leads advertising spending in the Levant with USD 463 million in 2013, followed by Jordan with only USD 140 million in spending the same year.⁹¹

These market trends corroborate the **score of 92.5** that ad tech obtained. Education and skills, infrastructure, synergies with other markets and industries, ease of exports, and resilience to security problems obtained a perfect score. As an illustration, Lebanon boasts a high number of graduates in business majors and in media, communications, and advertising, which are required for the ad tech sector to flourish.

BIGGEST MARKETS FOR AD TECH: Lebanon presents a competitive advantage for the development of ad tech products, especially in three key areas:

- **Mobile**, which will become the third-largest Internet advertising platform worldwide
- **Search**, which will continue having the largest share of total advertising revenue
- **Video**, which will witness the sharpest growth

Enterprise Software as a Service (SaaS)

Enterprise SaaS obtained a **score of 90**. SaaS should be viewed as a new business model for the delivery of services, and it gives Lebanese companies the possibility to overcome political instability and work around time-consuming export procedures by selling products over the cloud.

BIGGEST MARKETS FOR ENTERPRISE SAAS:

CRM/ERP/BPM - The growth of SaaS in the region can be attributed mostly to CRM sales, which were forecast to grow by 49% in 2014, and to contribute 30% of all spending on SaaS in the region through 2018⁹². Cloud-based office suites and ERP solutions will also grow rapidly in the SaaS market, and Gartner predicts that from 2014 through 2018, USD 1.3 billion will be spent on business

process as a service (BPaaS).⁹³ Growth in BPaaS will be slower than other segments, with spending projected to increase 8.1% through 2018.

Government - According to Gartner's 2014 predictions, public cloud offerings will grow through 2017 to account for more than 25% of government business services in areas other than national defense and security.⁹⁴ Cloud computing allows uniform, countrywide reach of e-government solutions, independently of the divergence of local administrative units.

Advertising - Cloud advertising is expected to remain the largest source of spending within the cloud services marketplace in MENA. The market is expected to grow from USD 56.6 billion in 2012 to USD 192 billion in 2016.⁹⁵

Media Streaming

Media streaming obtained a **score of 90**, with all factors scoring high except for infrastructure (poor broadband indicators) and legal framework (pending Intellectual Property laws). Two of the most known players in this subsector are Anghami, a digital music streaming app, and Cinemoz, an on-demand video portal for Arabic movies and videos.

BIGGEST MARKETS FOR MEDIA STREAMING:

Online music and video revenues in MENA are expected to grow at a rapid pace, providing opportunities for entrepreneurs in Lebanon. Indeed, YouTube statistics place MENA as the second-highest regional consumer worldwide, where 285 million videos are viewed every day, and two hours of video are uploaded every minute.

Consumer Internet (Social Networks and Apps, Search, Content Websites)

Consumer Internet is a competitive sector for Lebanon: it obtained a **score of 90** (social networks and apps), **87.5** (search), and **87.5** (Web and mobile portals, content websites and apps, news, Internet publishing).

The scores are in line with the market trends in the region. Indeed, search is growing at around 25% each year in the Arab world. Search engine marketing is used frequently by marketers, with 56% of companies in the Middle East using search engine optimization (SEO) and 35% using Pay per Click (PPC).

THERE IS AN ESPECIALLY HIGH DEMAND FOR ARABIC CONTENT CREATION: The number of active Arab Internet users is set to rise to 197 million by 2017⁹⁶. According to recent estimates, only 3% of online

content is in Arabic, while more than 60% of users in the MENA region prefer Arabic content. 35% of users search mainly in Arabic, while 24% search mainly in English and only 19% always search in English. CNN recorded a 70% increase in unique users and visitors to its Arabic language portal, *CNNArabic.com*, during 2013. Al Jazeera, MSN Arabia and BBC Arabic are also driving growth in Arabic news content. Demand for Arabic content still largely outweighs supply, thus indicating the potential for new products to serve the consumer Internet market.

It is worth noting that the only two company exits out of Lebanon thus far have been in consumer Internet: online recipes portal Shahiya was acquired by Japan-based Cookpad for USD 13.5 million in December 2014, and French company Webedia acquired a majority stake in digital content portal Diwaneer for a reported USD 25 million in March 2014.

Financial and E-Payment Solutions

Rounding up the top scorers is the financial and e-payment solutions subsector, which obtained a **score of 82.5**. The major obstacles for the development of this subsector are the weak regulatory framework (the *Electronic Transactions and Protection of Personal Data* law has been pending for years) and the subsector's dependence on a reliable Internet infrastructure. Worldwide, the mobile payments market is forecast to top 450 million users in 2017, with a CAGR of 18% for the period 2012-2017. In the MENA region, mobile payments are gaining popularity, and the number of mobile banking users is expected to jump from 19.8 million in 2013 to 82.1 million users by 2017.

Conclusion

The objective of this study was to conduct a competitive analysis of ICT subsectors in Lebanon. The research, desk interviews, and market trends indicate that among the 18 subsectors considered, Lebanon has a higher potential to thrive in gaming, e-health, ad tech, enterprise SaaS, media streaming, consumer Internet, and financial/e-payment solutions. Needless to say, the competitive advantages inherent to these subsectors do not preclude success stories in other subsectors that have scored lower. Directing resources and incentives to attract entrepreneurs and investors to one or more of the high-scoring subsectors could prove beneficial to the Lebanese startup ecosystem. Such effort requires a long-term strategy of engagement on the part of public and private sectors, and a concerted, sustained, multi-year effort in collaboration with all active players in the Lebanese technology ecosystem.

Appendix A: Project Details

This project brought together 3 studies:

The first study:

Global and MENA Trends

Refers to the market size and growth trends of the subsectors at the global and regional (MENA) level.

Global Market Size and Growth Trend

Refers to the current global market size and projected growth for each subsector.

MENA Market Size and Growth Trend

Refers to the current MENA market size and projected growth for each subsector.

The second study:

Enabling Factors for Subsectors

Refers to the requirements in education, infrastructure, capital, legal framework, and synergies with other markets or industries to ensure the success of the various ICT subsectors.

Education and Skills

Refers to the university majors, concentrations, and key skills required for work within the subsector.

Infrastructure

Refers to the broadband and other infrastructural requirements for the success of the subsector.

Laws and Regulations

Refers to the legal framework necessary for the success of the subsector.

Synergies with Other Markets and Industries

Refers to the markets and industries that have affinity and complementarity with the subsector.

Capital

Refers to the amount of investment necessary for a startup in the subsector to bring its first product or service to market. Indicated as High, Medium or Low. Ranges are applicable to Lebanon, with labor cost being the main variant with other countries. High refers to any amount above USD 1 million. Medium ranges from USD 100,000 to USD 1 million. Low refers to a capital requirement below USD 100,000.

The third study:

Status of ICT in Lebanon

Describes the status of each subsector in Lebanon. Refers to the number of local companies and employees working in the different subsectors; assesses the availability of skilled labor force, infrastructure, legal framework, and the degree of synergy with other markets or industries.

Number of Local Companies

Refers to the estimated number of companies currently operating in the subsector. The data is extracted from IDAL's IT Directory (2013) that is updated on a yearly basis.

Number of Employees

Refers to the estimated number of employees currently working in the subsector. The data is extracted from IDAL's IT Directory (2013) that is updated on a yearly basis.

Examples of Local and Regional Companies

Refers to sample companies working in the subsector.

Skilled Labor Force

Refers to the availability and accessibility of a skilled labor force in Lebanon. Data taken from Ministry of Education and Higher Education's 2010 records.

Infrastructure

Refers to Lebanon's fulfillment of infrastructure requirements for the success of the subsector.

Laws and Regulations

Refers to the availability of a robust legal framework for the IT subsector in Lebanon.

Synergies with Other Markets and Industries

Refers to the synergy potential with other Lebanese industries.

Sophistication of Local and Regional Customers

Refers to the experience and understanding of ICT buyers in Lebanon and the MENA region. Is a qualitative assessment (high, medium or low), based on desk research and interviews.

Intensity of Local and Regional Competition

Refers to the degree of rivalry among firms, market concentration and quality of products and services in the subsector in Lebanon and the MENA region. Is measured according to the number of operating firms in the subsector and their individual market share. Is a qualitative assessment (high, medium or low), based on desk research and interviews.

Ease of Export/Import

Refers to the availability of an export- /import-friendly environment in Lebanon. Indicated as Yes or No.

Resilience to Instability in Lebanon

Refers to the sensitivity of the subsector to political instability and insecurity in Lebanon. Is a qualitative assessment (high, medium or low), based on desk research and interviews.

Appendix B: Education and Skills Requirements for ICT Subsectors

Subsector	Education and skills
Ad Tech	<ul style="list-style-type: none"> • Business administration with emphasis on digital marketing and advertising • Media studies with emphasis on communication
Web and Mobile Portals, Content Websites and Apps	<ul style="list-style-type: none"> • Journalism, writing, blogging • Media studies with emphasis on communication • Digital publishing
Social Networks and Apps	<ul style="list-style-type: none"> • Engineering and computer Science with emphasis on Web development/design/architecture • Media studies with emphasis on communication • Business administration with emphasis on digital marketing and advertising • Psychology with emphasis on consumer behavior
Search	<ul style="list-style-type: none"> • Engineering and computer Science with emphasis on data structures, algorithms, artificial intelligence, and Web development/design
E-Commerce	<ul style="list-style-type: none"> • Engineering and computer Science with emphasis on software, Web and mobile applications development, programming, database management, and Web design and networking • Business administration with emphasis on marketing, logistics, supply chain management, and consumer behavior
E-Government	<ul style="list-style-type: none"> • Business administration with emphasis on information technology systems • Engineering and computer Science with emphasis on distributed systems and Web development/design/architecture
E-Learning	<ul style="list-style-type: none"> • Understanding of e-learning strategies with experience in curriculum planning, course design and the creation of e-learning educational content • Operating solutions (creating and commercializing products), e-content, curriculum development, consultancy, and teaching • Engineering and computer Science with emphasis on Web development/design/architecture, educational solutions (Virtual Learning Environments (VLE), Learning Management Systems (LMS), Learning Content Management System (LCMS), computer-aided assessment, Electronic Performance Support Systems, Instructional Systems Design (ISD)) • Education/administration and supervision, education/curriculum and instructional reading, educational technology/instructional technology
Financial and E-Payment Solutions	<ul style="list-style-type: none"> • Engineering and computer science with emphasis on computer information systems, software and mobile applications development • Business administration with emphasis on banking and finance, accounting, and retail banking
Enterprise Software	<ul style="list-style-type: none"> • Engineering and computer Science with emphasis on software design, computer architecture, programming languages, networks and operating systems, concurrent, parallel and distributed systems, and enterprise software • Business administration with emphasis on information technology systems, business analytics, decision science, and supply chain management
Gaming	<ul style="list-style-type: none"> • Engineering and computer science with emphasis on game and simulation development, software and mobile applications development, computer graphics

	and visualization, Web development/design/architecture
Infrastructure	<ul style="list-style-type: none"> • Business administration with emphasis on information technology systems, business analytics, and decision science • Engineering and computer Science with emphasis on computer architecture, distributed systems, cloud architecture, software/web/security engineering, computer security, cryptography, artificial intelligence, databases, and platform/information/service/risk/performance engineering
Media Streaming	<ul style="list-style-type: none"> • Audio and video production • Business administration with emphasis on digital marketing and advertising, marketing, media, entertainment • Media studies with emphasis on communication • Engineering and computer science with emphasis on Web development/design/architecture
E-Health and healthcare IT	<ul style="list-style-type: none"> • Engineering and computer science with emphasis on databases and distributed systems • Medical education (nursing/medicine/pharmacy/healthcare) • Education in health information, finance, and medical record administration • MBA with healthcare emphasis
Medical Devices	<ul style="list-style-type: none"> • Mechanical and hardware engineering • Clinical engineering, medical engineering technology • MBA with healthcare and management of engineering and technology emphases
Biotechnology	<ul style="list-style-type: none"> • Biomedical engineering • Biotechnology • Bioengineering • Bioinformatics/biological computation (foundations of computer science, applied mathematics, animation, statistics, biochemistry, chemistry, biophysics, molecular biology, genetics, genomics, ecology, evolution, anatomy, neuroscience, and visualization)
Semiconductors	<ul style="list-style-type: none"> • Engineering and computer Science with emphasis on microprocessors and digital circuits • Chemical and electrical engineering • MBA with emphasis on management of engineering and technology
Small Hardware Products	<ul style="list-style-type: none"> • Engineering and computer science with emphasis on computer design, electronics, electric circuits, circuit boards and their components, electromagnetics, computer design, microsystems design, embedded systems and computer networks • MBA with emphasis on management of engineering and technology
Telecom Services	<ul style="list-style-type: none"> • Business administration with emphasis on marketing, advertising and technology • Electrical and computer engineering with emphasis on telecom and networks
Telemarketing and Call Centers	<ul style="list-style-type: none"> • Business administration with emphasis on marketing and advertising
VAS	<ul style="list-style-type: none"> • Business administration with emphasis on marketing and advertising • Electrical and computer engineering with emphasis on telecom and networks • MBA with emphasis on consulting and strategy

Appendix C: Infrastructure Requirements for ICT Subsectors

Subsector	Download (Kbps)	Upload (Kbps)	Latency (ms)	Other Infrastructure Requirements
Ad tech				Regulatory framework supportive of advertising
Web and Mobile Portals, Content Websites and Apps	>750	>250	<160	
Social Networks and Apps	>750	>250	<160	
Search	>750	>250	<160	
E-Commerce	>750	>250	<160	Proper import/export regulations Logistics support (warehousing, storage, shipping) Shipping solutions that reduce cost and delivery time
E-Government	>750	>250	<100	Accessible and affordable telecom and Internet infrastructure
E-Learning	>2500	>1500	<100	Accessible and affordable telecom and Internet infrastructure Access to e-payment solutions
Financial and E-Payment Solutions	>750	>250	<160	High retail banking penetration High telecom penetration Payment gateway businesses
Enterprise Software	>750	>250	<160	
Gaming	>750	>250	<160	Access to e-payment solutions
Infrastructure	>2500	>150	<100	
Media Streaming	>750	>250	<160	High broadband penetration
E-Health and Healthcare IT	>2500	>1500	<100	Accessible and affordable telecom and Internet infrastructure
Medical Devices	n/a	n/a	n/a	R&D, advanced technology Integration between hospitals and manufacturers
Biotechnology	n/a	n/a	n/a	R&D, advanced technology
Semiconductors	n/a	n/a	n/a	Clean water and reliable electricity, cleanrooms
Small Hardware Products	n/a	n/a	n/a	Availability of raw materials and reshipping of manufactured products. Availability of and access to laboratories and manufacturing facilities. Economies of scale, access to cheap parts
Telecom Services	n/a	n/a	n/a	Telecommunication networks Fixed-line, wireless, and satellite infrastructures
Telemarketing and Call Centers	n/a	n/a	n/a	Physical infrastructure and media services Telecom services Logistics support (warehousing, storage)
VAS	>750	>250	<100	Proper telecom infrastructure and services

Appendix D: Select Indicators for Lebanon

Data in this table were collected from the Global Competitiveness Report 2013-2014.

	Score (0–100) or value (hard data)	Rank
Business Sophistication	39.1	38
Knowledge Workers	65.5	18
Knowledge-intensive employment, %.	31.9	41
Firms offering formal training, % firms	52.4	21
Innovation Linkages	24	78
University/industry research collaboration	35.5	106
State of cluster development	37	110
Knowledge Absorption	24.0	78
FDI net inflows, % GDP	8.7	17
Quality of Education	4.8	32
Quality of the Educational System	4.6	28
Quality of Math and Science Education	5.7	5
Knowledge and Technology Outputs	22.6	96
Knowledge Creation	16.3	64
Knowledge Impact	24.7	116
High- and medium-high-tech manufactures, %	22	48
Knowledge Diffusion	26.7	97
High-tech exports less re-exports, %	0.2	93
Comm., computer & info. services exp., % total trade	1.7	50
Creative Outputs	27.4	93
Creative Goods and Services	29.5	39
Online Creativity	8.2	100

Appendix E: Higher Education Graduates in Lebanon

Data in this appendix were collected from the Ministry of Education and Higher Education of Lebanon. However, these numbers date from 2010, and 15% was incorporated to account for the expected increase in the number of graduates between 2010 and 2014.

	Total 2009-2010	2014 Estimate
Engineering and IT		15,002
Computer and Communications	3,720	4,278
Computer Programming and Analysis	3,486	4,009
Engineering Informatics	1,553	1,786
Electrical Engineering	1,508	1,734
Mathematics and Informatics	735	845
Electronic Engineering	713	820
Wireless Communication Engineering	326	375
Information Technology	285	328
Electricity and Electronics	222	255
Communications Engineering and Networks	182	209
Electrotechnology	151	174
Industrial Informatics	66	76
Wired and Wireless	54	62
Electronic Engineering Informatics	35	40
Engineering Informatics and Electricity	9	10
Mechanical Engineering	2,566	2,951
Business		34,277
Business Administration	21,272	24,463
Banking and Finance	3,937	4,528
Accounting	3,795	4,364
Management	3,565	4,100
Information Management	2,684	3,087
Economics and Management	1,936	2,226
Management and Marketing	206	237
Engineering Management	136	156
Economy of Communications and Technology	7	8

Medical and Health Studies		18,538
Nutrition	5,248	6,035
Pharmacy	2,871	3,302
Medicine (general and specific)		3,107
Biology	2,067	2,377
General Medicine	1,829	2,103
Nursing	1,594	1,833
Science Laboratory	1,441	1,657
Medicine (specific)	873	1,004
Management of Health	136	156
Health	54	62
Medical Engineering Technology	7	8
Psychology	4,251	4,889
Media, Advertising and Marketing		5,489
Marketing and Advertising		3,013
Marketing and Advertising	1,179	1,356
Advertising and Design	872	1,003
Press Radio and TV	844	971
Journalism	679	781
Public Relations and Advertising	514	591
Public Relations	255	293
Languages and Communication	252	290
Media	123	141
Advertising and Communication	55	63
Literature		19,320
English	8,400	9,660
Arabic	6,453	7,421
French	1,947	2,239
Education		457
Educational Administration	323	371
Educational Guidance	74	85
Biotechnology		7,593
Medicine (general and specific)		3,107
Biology	2,067	2,377
Science Laboratory	1,441	1,657
Biochemistry	308	354
Chemical Engineering	77	89
Molecular Biology		9

Appendix F: Sophistication of Local and Regional Customers, and Intensity of Local and Regional Competition

Subsector	Sophistication of Local and Regional Customers	Intensity of Local and Regional Competition
Enterprise Software	High	High
Infrastructure	Medium	Medium
Financial and E-Payment Solutions	High	High
E-Commerce	Medium	High
Web and Mobile Portals, Content Websites and Apps	Medium	High
Social Networks and Apps	High	High
Search	High	High
Ad Tech	Medium	Low
Media Streaming	High	High
Gaming	High	High
E-Learning	Medium	Low
E-Government	Low	Low
E-Health and Healthcare IT	Medium for e-health Low for healthcare IT	Medium for e-health Low for healthcare IT
Medical Devices	Low	Low
Biotechnology	Low	Low
Semiconductors	Low	Low
Small Hardware Products	Medium	Medium
Telecom Services	High	Low
VAS	High	Medium
Telemarketing and Call centers	Low	Low

Appendix G: Resilience of Subsectors to Instability in Lebanon

Subsector	Resilience to Instability in Lebanon
Enterprise Software	High (if SaaS)
Infrastructure	High
Financial and E-Payment Solutions	Medium
E-Commerce	Low
Web and Mobile Portals, Content Websites and Apps	High
Social Networks and Apps	High
Search	High
Ad Tech	High
Media Streaming	High
Gaming	High
E-Learning	Medium
E-Government	High
E-Health and Healthcare IT	High for e-health Low for healthcare IT
Medical Devices	Medium
Biotechnology	Low
Semiconductors	Low
Small Hardware Products	Low
Telecom Services	Low
VAS	Low
Telemarketing and Call centers	Low

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