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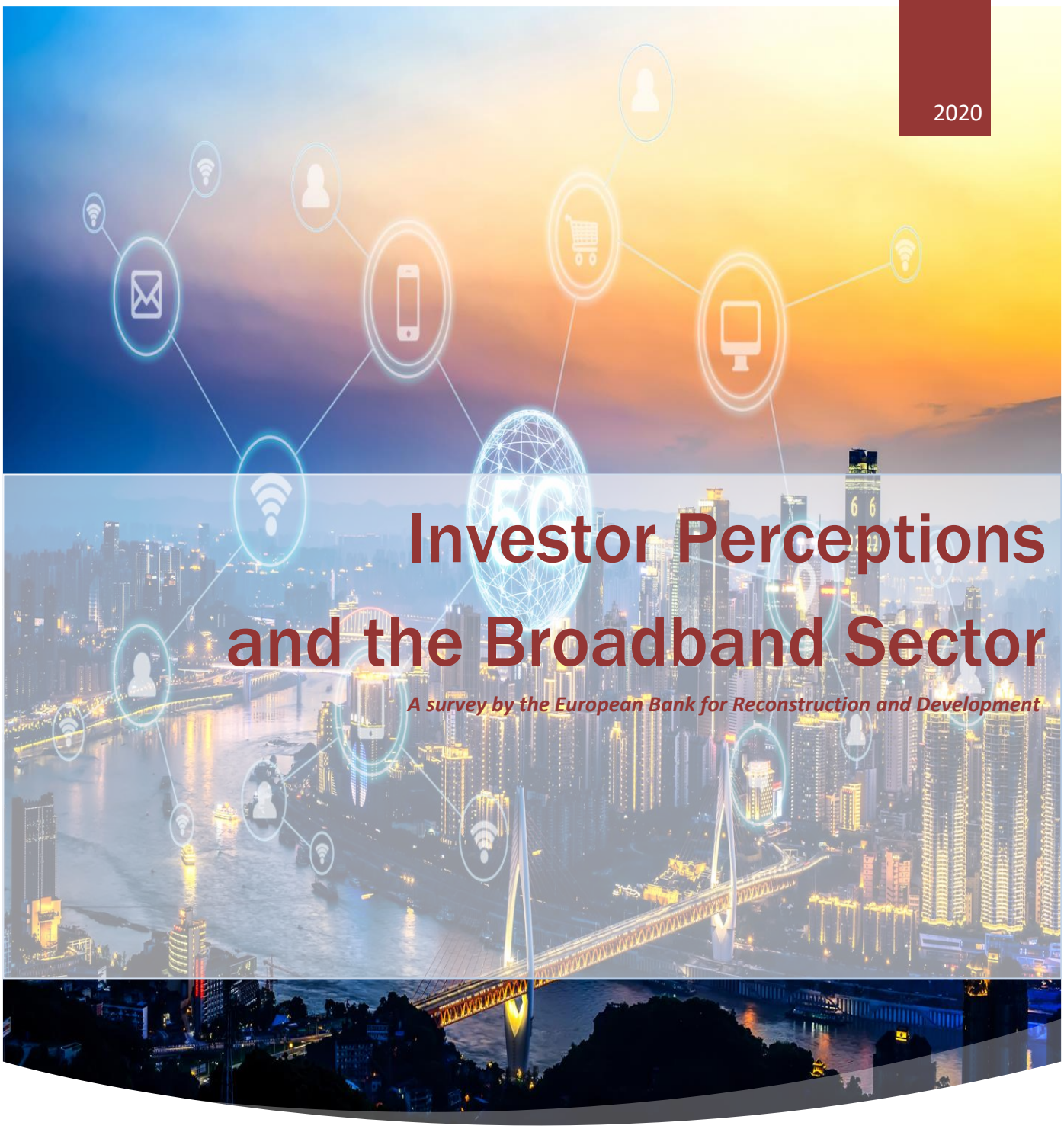


Investor Perceptions and the Broadband Sector

A survey by the European Bank for Reconstruction and Development

Southern and Eastern Mediterranean Region

&

Egypt

European Bank
for Reconstruction and Development

Survey context and disclaimer

The EBRD has conducted this survey to contribute to dialogue aimed at advancing development of the sector, its regulation and governance, in particular to promote investments in broadband infrastructure by improving investment conditions.

The views expressed in this report are from the survey respondents themselves and as such are not necessarily the views of EBRD or its representatives. The summaries and recommendations in the report have also been based on conversations with respondents and analysis of the collected views.

The views of respondents were given in confidence and accordingly, in the report, specific statements are not attributed to individuals or organisations.

The respondents' views were expressed here to stimulate and inform debate with policy makers and other organisations that influence broadband markets for investment in each country.

Contents

0: EXECUTIVE SUMMARY

This report examines conditions for investment in broadband infrastructure in Egypt, Jordan, Lebanon, Morocco and Tunisia – collectively these are five of the Southern and Eastern Mediterranean countries that EBRD operates in ('SEMED'). To collect these views, a survey team has held over 50 face-to-face meetings with stakeholders having a direct interest in the Information and Communications Technology (ICT) sector, including policy makers from governments, regulators of the sector, the networks and services operators, financial institutions, sector representative bodies and consultants. These meetings were conducted during the second half of 2019.

In addition, and to back-up these face-to-face meetings, an on-line questionnaire was sent to a wide variety of stakeholders from the ICT sector in the five countries surveyed. This report summarises the views expressed in both the face-to-face discussions and from the completed on-line surveys. Throughout the survey, to allow for a frank and forthright discussion, respondents were asked to express their views in strictest confidence. Many of their comments have been included in this survey report without attributing them to an individual or an organisation, therefore maintaining this confidentiality.

Investments in broadband infrastructure take the form of networks to support fixed and mobile broadband services, together with the necessary civil engineering structures and associated equipment. Around 70% of the survey respondents have investments in fixed or mobile networks plus customer service centres, 60% or more have data centres and civil engineering structures, mainly buildings and towers. Of growing importance are investments in new business models linked to connectivity. These growing investments include smart cities, vertical industry sector partnerships, logistics, content, data analytics and the "Internet of Things"[1]. Only a minority of the respondents surveyed had interests in TV or satellite networks.

In this report, the views of respondents are seen very much in the context of the introduction and potential widespread growth in 5th Generation (5G) spectrum-based services plus increased investments in fibre access services. When respondents criticise the current situation from a policy, legal or regulatory standpoint, they most often express the view that the current situation must change in order for them to make their next investment decisions in 5G and/or fibre networks more confidently.

The survey has attempted to make a comparison between the investment conditions in the seven markets covered. The main components of the respondents' perceptions are:

- Their views on pure market factors – the market size, growth and investment potential
- Their views of the investment risks – the barriers that limit or delay investments

For the second aspect, investment risk, we have identified 14 factors that contribute most to broadband investment risks, as follows:

- The country's overall legal system, predictability and process
- The legal and regulatory framework specific to electronic communications and broadband investments
- State participation in the sector, for example through ownership of one or more players in the market
- State assistance and funding schemes
- Quality of databases and access to information
- Availability of labour especially with digital skills
- Labour regulations, employment agreements, militancy, disruptions
- Access to state-controlled resources related to investment in networks and services, notably spectrum
- Certainty in construction permits or wayleaves
- Taxation generally or targeted at the sector
- Overall infrastructure
- Trade barriers
- Political stability, security, criminality, terrorism
- Corruption generally or in any aspect of operations

[1] https://ec.europa.eu/digital-single-market/en/news/b-day-boosting-connectivity-investments

These factors have been identified from previous surveys conducted by EBRD[2]. Respondents in the current survey were asked also to add any views regarding broadband investments that are not covered by the above list. We have found that these 14 factors listed cover the majority of risks present in the broadband investment markets. Where any other concerns were made known, they were relatively minor and have been recorded in the results of this survey given later in this report.

For each of the market and risk factors, respondents were asked to state how the situation in the county affected their investment decision making. They were asked to choose one of the following answers for each factor considered:

- Positively encourages investment
- Does not deter investment
- Mildly deters investment
- Strongly deters investment
- No opinion.

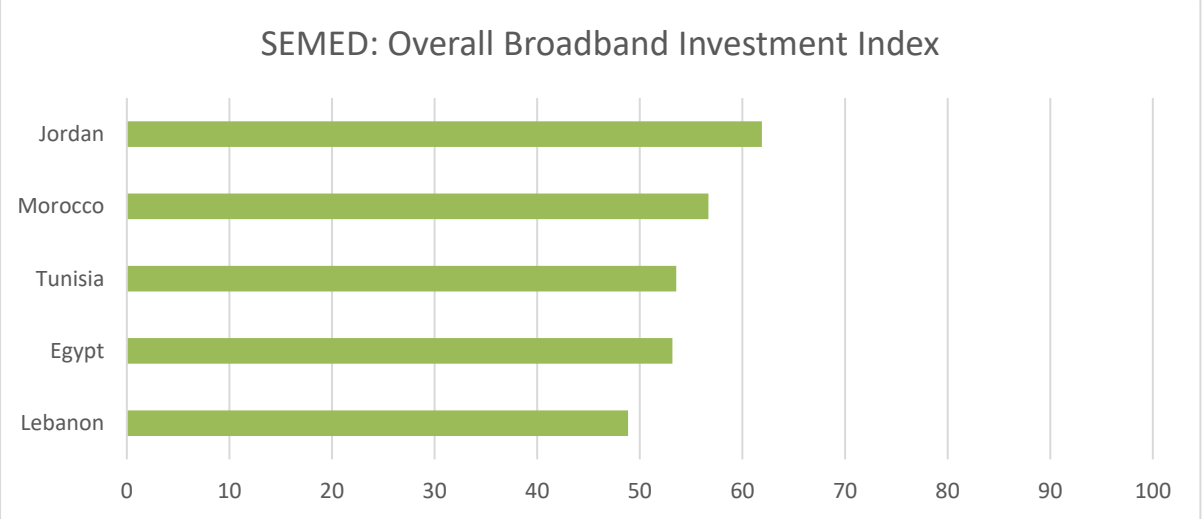
Respondents were also asked to indicate, when they are making investment decisions, what was the relative emphasis they place on the pure *market factors* on the one hand and the *investment risk factors* on the other. The results were:

Relative weights in broadband investment decisions

Pure market factors: 53%

Investment risk factors: 47%

Finally, respondents were asked how confident they were about the country adopting best practices across the sector, in policy and law-making, in regulation and in implementation. By combining the results obtained from these opinions on market attractiveness, investment risk and best practice potential, we were able to estimate the overall perception of each market by respondents:



On the comparative scale, zero would indicate a perception that the investment climate is very poor. A score of 100 would indicate a perception that the overall conditions are perfect for investment. The method of calculation of the index is given in section 2 of this report.

Jordan, although not the largest market in population terms, came out the with the best measure, taking into account its market potential and the investment risks involved. Morocco, the second largest market, has

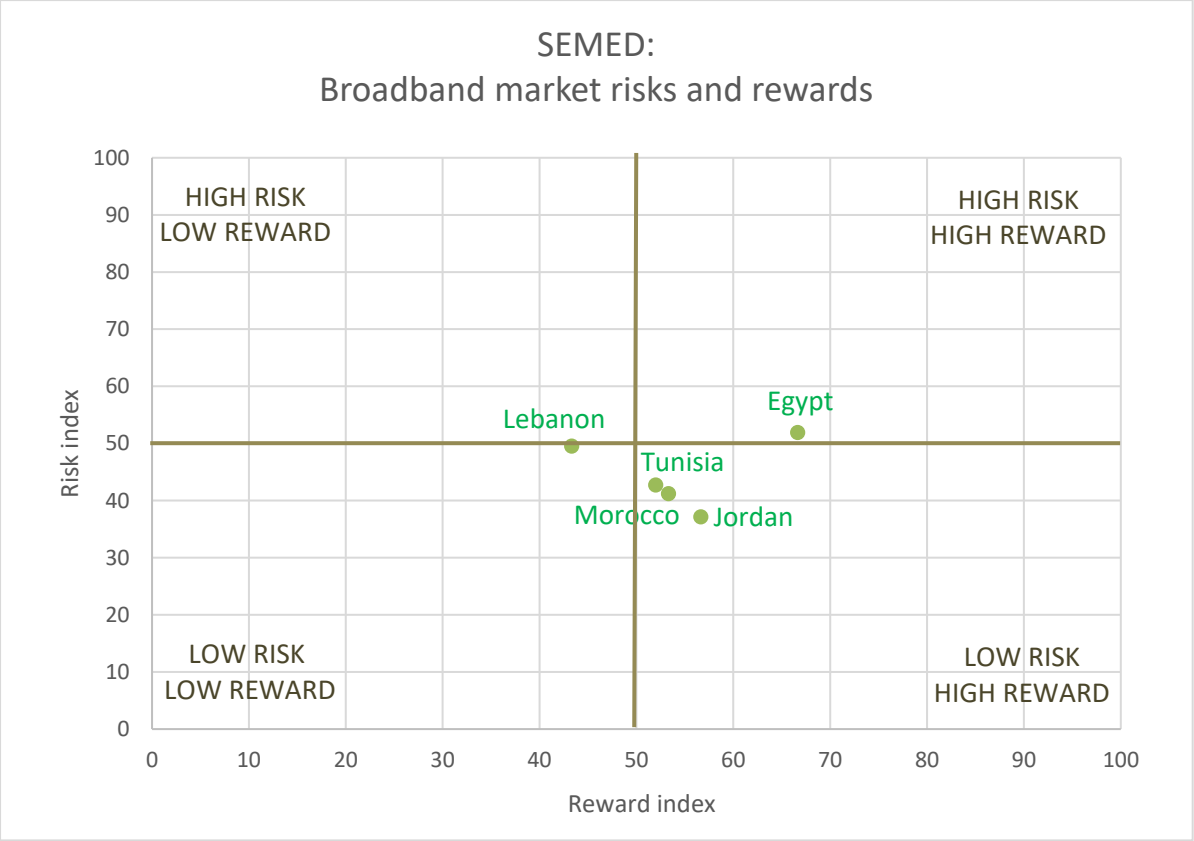
[2] The EBRD carried out surveys of the ICT sector in 2008, 2012 and 2016, results are available on request.

some risks mainly associated with taxation and policy. Tunisia also has high taxation including import duties as well as problems with policy and regulation. Egypt, the largest market, is the most attractive in pure market potential, but suffers from the highest investment risks, mainly associated with the high level of state control. Lebanon was perceived to be the least attractive country by respondents, mainly due to the risks associated with state intervention and an ineffective policy and regulatory framework.

Risks and rewards

Using the results of the survey, we are able to present a picture of the relative risks and rewards associated with broadband investments. In the graph below, the Reward index is derived from the ratings by respondents of the pure market potential in terms of market size, growth and possible returns. A value of zero represents zero market attraction and 100 represents perfect attraction. The Risk Index is derived from a separate rating by respondents across a number of potential investment risk factors ranging from policy weaknesses, legal and regulatory bottlenecks, taxation and availability of resources. A value of zero represents zero risk and 100 represents absolute risk.

The ideal position on the chart is in the lower right-hand corner where rewards (horizontal axis) are highest and risks (vertical axis) are lowest.



On the Reward Index scale (x-axis) a value of zero represents no market attraction and 100 represents perfect attraction, On the Risk Index scale (y axis) a value of zero represents zero risk and 100 represents absolute risk.

The survey respondents rated Egypt as having the best pure market potential, but with the highest investment risks. Jordan, Morocco and Tunisia have relatively lower rewards and lower risks. Lebanon has the lowest reward and carries high investment risks.

Priorities for action

To examine the factors that respondents used to make this overall assessment, the survey has examined the main risk factors, as expressed by respondents. We have used these views to prioritise the main issues for each country. For these priority issues, this report defines the key action areas to be addressed if the barriers to investment are to be reduced, making the countries more attractive in investment terms. The key action areas for each country are shown in the table below.

SEMED countries: Priorities for action

Investment risk factors	Egypt	Jordan	Lebanon	Morocco	Tunisia
Taxation generally or targeted at the sector	!	▲	!	▲	▲
Access to spectrum resources	▲	▲	!	!	!
The legal and regulatory framework specific to electronic communications and broadband investments	▲	!	▲	!	!
The country's overall legal system, predictability and process	!	●	▲	!	!
State participation in the sector	▲	●	▲	●	!
State assistance and funding schemes	▲	●	▲	●	!
Certainty in construction permits or wayleaves	▲	●	●	▲	!
Trade barriers	!	●	●	●	▲

● - Low priority/ ! - Medium priority/ ▲ - High priority

The recommendations for each country are given in more detail in Section 3 of this report.

The general recommendations resulting from this survey

Taking the respondents' own views, the survey offers a number of general recommendations for increasing the attractiveness of these five markets and decreasing investment risks. The recommendations are relevant to all the countries, but their relative priority for action is governed by the table above.

More detailed and specific recommendations are given in section 4 of this report. In summary, and taken together, these recommendations seek to create better conditions for broadband infrastructure investments:

- Governments should create an environment that maximises private investment. Experience from other countries clearly shows that private participation in broadband infrastructure programmes makes any public funds used go significantly further.
- Private involvement also helps to create programmes that are commercially sustainable in the long term, as opposed to ones that continually rely on state aid and other subsidy programmes.
- The key role of the state is to establish a clear policy for broadband, within which the investment strategies of market players can have greater confidence. This policy should include the support

and stimulation of demand for broadband-based services such as eGovernment and eCommerce.

- A relevant renewed component of state policy is the role that governments can play in intervening in their markets in order to provide additional funding where necessary to achieve universal broadband access. The necessary conditions for additional state funding include where the private sector is not planning to invest in particular geographic areas (within the timescale required by the state policy to achieve universal broadband coverage). It is important to ensure that any such state funding does have an unwanted distorting effect on the broadband market. State policy in this respect should therefore include relevant "state-aid" rules such as those adopted by the European Union (EU) for broadband markets[3].
- A key component of any broadband policy should be to ensure that all relevant decisions made by government and regulators are consistent with the need for investment to take place without undue barriers. Key examples of these barriers are high levels of taxation on the sector and high charges for access to government-managed resources, notably spectrum resources.
- Future investment efficiencies could be further promoted by policy and regulatory actions. At present there are significant wasted network expenditures on separate civil structures, most often ducts and transmitter masts. Additional costs are also incurred by investors in the delays and uncertainties they experience in getting construction permits and access to rights of way.
- More cooperative models involving network and infrastructure sharing, joint cost ventures and greater cooperation of civil works could be introduced to ensure that broadband infrastructure investments maximise the effectiveness of the market, bringing greater economic and social benefits.

The general recommendations, taken together, have resulted from respondent's views. We believe that, if adopted, these recommendations should have a significant positive impact on the future investment climate in the countries surveyed.

Section 4 of this report gives nine specific recommendations arising from this survey, based on the views of respondents. Included in these recommendations are some examples of best-practice models for reducing investment barriers, risks and delays.

Overall outlook

The overall view of respondents is one of good market potential, especially with continuing broadband growth together with the promises of 5G[4] and the increasing demand for fibre access services. These technologies are confidently expected to expand significantly the current range of ICT services and to have a transformational impact on the development of all sectors of economic and social activity. The improved broadband speeds, quality, and reliability promised by 5G and fibre will revolutionise the sector, bringing increased scope for more cross-sector coordination and new business models, all bringing new revenue sources to the ICT sector.

In this survey, respondents expressed the view that the full benefits of the ICT market are currently not being achieved in the five countries. In their view, the policies and regulatory frameworks in these countries are lagging behind best practice. The new and extended scope of markets created by 5G and fibre access technologies are likely to impact all sectors of the economy in all countries. The traditional networks and service operators will need to explore new, more co-operative ventures in partnerships with a larger number of players. These new business models will involve joint investments, not only within the broadband sector, but also with other sectors, including manufacturing, transport, agriculture, logistics, education, healthcare, public administration and many more.

Respondents also expressed the opinion that their current experience in relation to joint investments and industry cooperation has not been good. There are too many examples of separately owned infrastructure (for example ducting, fibre backbone networks and transmission masts) where cost-saving joint investments or infrastructure sharing opportunities have been missed. With the need for greater network reach and even

[3] https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2013:025:0001:0026:EN:PDF

[4] https://www.digitaltrends.com/mobile/what-is-5g/

more transmitter masts, these cost reduction measures must become a more normal feature of broadband infrastructure investments.

Respondents believe that only with a more collaborative approach within the sector, and between the network operators and other sectors, can the overall transformative economic and social impact of new 5G and fibre- based technologies be achieved. If these more collaborative approaches do not materialise, the risks facing investors will continue to be high and the full benefits to the investors, to wider industry and society will not be achieved.

Drawing on these views, the recommendations in this report are designed to inform priority-setting activities by policy makers and ICT sector regulators as they move to adopt many of the best practices already being used elsewhere.

Additional statement regarding the COVID-19 pandemic

The analysis for this report took place in the second half of 2019 and no account has been taken of the subsequent impact of the COVID-19 pandemic. The forecasts of fixed and mobile broadband growth are based on 2019 data and cover the period up to 2023. These forecasts are likely to be affected by the pandemic, typically arising from a greater demand from personal and business users for social and work-related networking.

Although the impact is likely to vary from market to market, the overall relative growth rates should remain consistent. For example, the relatively high growth rates for broadband services in Egypt and Morocco (17% and 12% per annum) are likely to be maintained as broadband coverage improves. The relatively lower growth rates in Lebanon, Jordan and Tunisia (from 3% to 6% per annum) will continue to reflect the greater relative level of saturation already achieved in those markets.

Broadband speeds appear to be affected[5] for example, fixed broadband speeds in Jordan have increased by 44% and Tunisia by 30%. Mobile broadband speeds have reduced in Morocco and Tunisia while Jordan mobile broadband speeds have risen by 7% and in Lebanon by over 100%. The inconsistency of these changes will add further uncertainty to investment conditions.

Several SEMED countries adopted measures to cope with the increasing demand for communications services during the COVID-19 outbreak. For example, governments in Egypt and Tunisia requested operators to provide free internet packages and to offer free access to e-learning and healthcare platforms. In Egypt, the cost of the additional data packages and free browsing was financed by the state. The regulator in Jordan temporarily granted telecoms operators additional spectrum to increase network capacity.

This report makes both general and detailed recommendations based on the analysis of respondent views given before the coronavirus outbreak. These recommendations will still apply and in many instances with their relevance brought more into more focus by the new situation. The case for further investment in broadband infrastructure has increased, now with even more focus on more reliable and universal broadband services.

At a policy and regulatory level there will also be greater focus on the collaboration between government investments and private sector investments. This is particularly relevant in areas such as policy consultation, the use of public funds, achieving universal broadband coverage and the need for greater investment efficiencies to achieve cost reductions and greater network resilience.

An “Agenda for Action” recently adopted by the United Nations Broadband Commission for Sustainable Development[6] suggests a set of tangible actions to mitigate the impact of the COVID-19 pandemic and to ease the immediate adverse impacts for economies and societies. Their initial recommendations cover measures on resilient connectivity, affordable access and the safe use of on-line services.

[5] https://www.speedtest.net/insights/blog/tracking-covid-19-impact-global-internet-performance/#/

[6] https://broadbandcommission.org/COVID19/Pages/default.aspx

UN Broadband Commission

COVID-19: Short-term, agenda for governments and policy makers/ regulators

"Temporarily relieve network capacity constraints and keep networks running and operational (including decreasing taxes and fees, offering wholesale services, temporarily freeing up additional spectrum which can be immediately deployed, infrastructure sharing, using existing universal service funds, promoting cross border roaming etc.)

[Extract from short term actions for resilient and secure connectivity https://broadbandcommission.org/COVID19/Pages/default.aspx]

Although these UN Broadband Commission recommendations have been made in the context of short-term actions for mitigating the impact of the COVID-19 pandemic, they include some specific themes that enhance broadband infrastructure efficiencies that have been viewed as desirable by investors before the pandemic arose.

In section 4 below "Detailed Recommendations" we make the case, based on the views expressed by our survey respondents during 2019, for greater investment efficiencies, notably in the following areas which are also relevant to short-term COVID-19 mitigation:

- Clear national policy for broadband, based on public and private sector investor consultations, supported by a best-practice legal and regulatory framework (Recommendations 1, 2 and 5).
- Faster permission granting procedures for network construction (Recommendation 3).
- Taxation of the telecommunication sector with regard to a wider strategic view of the required investments in the sector (Recommendation 6).
- The use of state aid (and for example universal service funds) to work alongside private investment, accelerating broadband access and affordability (Recommendation 7).
- Efficient exploitation of spectrum resources, particularly in the planning and management of spectrum releases for 5G (Recommendation 8).
- Greater broadband investment efficiency and co-operation, including making use of wholesale markets, infrastructure and network sharing plus a range of cost-reduction measures specific to broadband investments, backed up by best-practice regulations (Recommendation 9).

Our recommendations are fully consistent with the UN Broadband Commission work. Both sets of actions arise out of consultations with the public and private sector investors. Our recommended actions on network and market efficiencies were relevant to investors before the COVID-19 pandemic and are judged to be more urgent now.

1: BACKGROUND AND OBJECTIVES

Background

Under the Legal Transition Programme of the European Bank for Reconstruction and Development (the "EBRD" or the "Bank"), the Bank's Legal Transition Team has focused part of its work on the development of detailed analytical assessments of the state of legal, policy and regulatory transition in a number of commercial and financial sectors of its countries of operation. These assessments benchmark the developments in these sectors in each country against recognised international best practices, providing analysis of the existing legislative framework, comparison of that framework with best practice and the identification of gaps and legal and regulatory reform needs.

The Bank has carried out regular (in 2008, 2012 and 2016) assessments of the telecommunications/ICT sector in its countries of operation[7]. These assessments have focused on the overall potential of the sector for reforms that could improve the broader investment climate in the sector, in particular, to improve the infrastructure for delivering modern broadband services. The previous assessment approach used by EBRD has been to study key characteristics of the market, in terms of output metrics (for example broadband penetration, eGovernment and eCommerce world rankings) alongside a comparison between the legal and regulatory framework and best practice in the sector. The methodology relied on building an accurate picture from the outputs of the sector itself alongside on the policy, legal and regulatory environment for investors, service providers and consumers.

This 2020 survey report takes a different approach, one in which the informed views of investors has the most impact. The approach is based on investors' immediate concerns in terms of which factors in each country contribute most to decisions on whether to invest or not. The results have therefore identified the countries that have the most attractive markets and policies for encouraging investment, particularly for broadband infrastructure and connectivity. The survey outputs, in the form of a ranking of investment attractiveness and a listing of the key investment risk factors, are intended not only to inform investors, but also to prompt policy makers to consider reforms that would improve investment conditions in their countries.

To help with the development and conduct of the survey, EBRD retained an external consulting advisor[8]. The requirements for the survey and analysis methodology are defined in section 2 of this report, which also contains a description of the survey methodology plus the definitions of the required calculations, indexes and rankings.

Countries included in the survey

The countries intended to be included in the 2020 survey are:

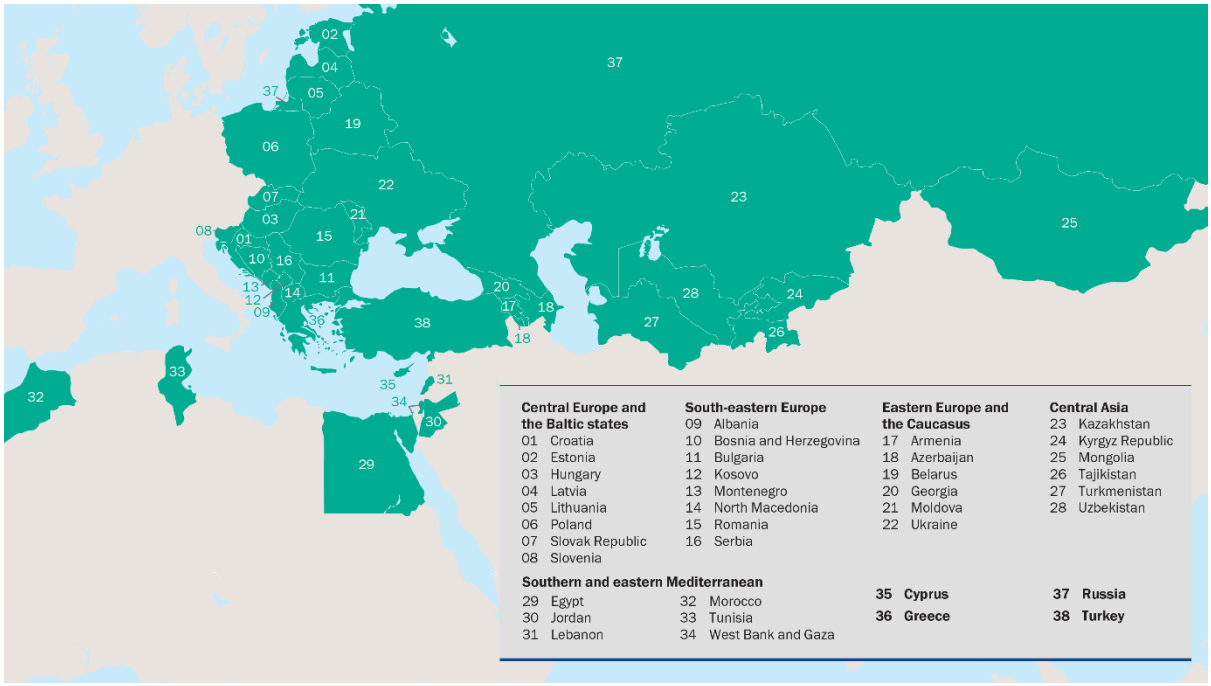
- From the Southern and eastern Mediterranean (SEMED) region: Egypt, Jordan, Lebanon, Morocco and Tunisia
- From the South eastern European countries (SEE) region: Albania, Bosnia and Herzegovina, Croatia, Kosovo, Montenegro, North Macedonia and Serbia
- From the Eastern Europe and the Caucasus (EEC) region: Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine
- From the Central Asia region: Kazakhstan, Kyrgyz Republic, Mongolia, Uzbekistan

This SEMED Report is the first to be published and covers: Egypt, Jordan, Lebanon, Morocco and Tunisia. The SEMED Report also acts as a test bed for the survey methodology and reporting, with its conclusions and outcome informing the roll-out of the survey to the other regions covered and helping to prepare a Full Report on the countries listed above. Reports from the other regions will be published during the course of 2020.

[7] See http://www.ebrd.com/where-we-are.html

[8] Cullen International, an international and independent research organisation specialising in the ICT sector https://www.cullen-international.com/

EBRD countries of operation



Objectives of the survey

The overall objective of this survey is to inform investors, policy makers, regulatory and other influencers of investment so that they can make decisions that will increase effectiveness in sector investments and thereby improving broadband infrastructure coverage and capacity.

The survey has involved a wide range of existing and potential stakeholders in investment in broadband infrastructure and service, including finance providers, telecommunications network operators, broadband and internet service providers, analysts and other market stakeholders.

The specific objectives of this survey, analysis and assessment are:

- To produce a comparative "Broadband Investment Index" for each country plus relevant sub-indexes, that will inform policy makers and market participants, based on the perceptions of investors.
- To provide a focus on identifying the key enablers to investment in each country as a means of informing policymakers of specific impediments to sector growth. Such identification should also help EBRD focus its resources in engagement with policy makers and market participants as a means of reducing barriers and increase investment in the sector.

The main output of the survey, analysis and assessment is a ranking of countries, based on their investment attractiveness, with further explanations for each country giving the main reasons expressed by investors that have led to the index and ranking calculated.

The telecommunications/ICT sector and broadband infrastructure investment

The focus of this survey is the broadband infrastructure that enables access to fixed and mobile broadband services. This infrastructure includes electronic communications networks providing access through higher speed broadband services, plus the enabled digital services market, most notably delivered through digital media services and the internet. ICT sector investments will increasingly target new markets and business models linked to greater connectivity. This includes smart cities, vertical industry sector partnerships, logistics, content, data analytics and the "Internet of Things".

The policy, legal and regulatory frameworks for the infrastructure market providing access to broadband services have undergone significant changes since the latter part of the 20th century. These changes have

been driven by the rapid development of digital technologies and the internet. The traditional telecommunications, internet and broadcast media services markets have been transformed by the influences of these technological developments.

In particular, the model of state-owned monopoly telecommunications and broadcasting infrastructure has been largely replaced by the more liberalised competitive supply of fixed and mobile services. This has responded to more sophisticated consumer demands for better quality services, mobility and the expected higher speeds of access required for a larger range of internet and media services.

The pace at which ICT-based markets have been transformed has varied from country to country. One of the significant determinants of the speed of transition from monopolistic to competitive markets has been the progress made by each country's policy and law makers in adopting the enabling legal and regulatory frameworks. To put in place modern digital network infrastructures with competitive service delivery, the legal and regulatory frameworks have to be seen as enablers, not barriers, to investment.

In addition to the attractiveness of the broadband market, investors (whether existing operators or new market entrants) require an effective legal and regulatory framework to help reduce risks and increase their confidence to invest.

The goal of universal broadband connectivity

Since the wave of privatisations across the sector from the 1980s onwards, the majority of investments in ICT sector infrastructure are now private sector investments. In recent years, a parallel role for public investment has been proposed. This additional state investment seeks to fill the gap caused by the lower private commercial investment returns resulting from a state policy to achieve universal broadband access to all citizens, including the more remote regions.

Policy makers have adopted different types of market interventions, including:

- Market demand stimulation (for example through the implementation of eGovernment services).
- Direct public subsidies that accelerate private investment into the more remote regions, including via public-private partnerships.
- Direct public investments in broadband infrastructure for delivering government services and to provide wholesale capacity for the commercial operators to exploit.

Private investors see these types of public investments as complementary to and supporting of private investments, not as competing networks. Governments should continue to create an environment that maximises private investment at the outset. Private involvement also helps to create programmes that are commercially sustainable in the long term, as opposed to ones that continually rely on state aid and other subsidy programmes.

Growth drivers

Broadband market investors have faced new challenges. In the countries surveyed, competitive markets have been introduced, allowing new entrants to provide services, both by direct infrastructure investment and by exploited the existing broadband connectivity provided by incumbent operators. The new entrants include providers of "over the top" services, starting with voice services over the internet ("VoIP services"). Users can now also benefit from a wide range of "streaming" services using the internet, giving multi-media content including high-definition video.

These new services have significantly threatened the traditional revenues of the existing network operators, forcing them to find new market offerings, including "bundled" fixed and mobile broadband-enabled packages of voice, internet and video content.

Additional technology developments, particularly in mobile communications, have allowed faster and more reliable broadband connectivity. 3G and 4G mobile services are now reaching almost full population coverage. The growth in the number of users and the higher data download speeds demanded by those users have already attracted significant new investments to keep up with this new demand.

As well as the existing competition between the larger network operators, new forms of competition have developed, attracted by the growth in demand for broadband-enabled services. The continued growth in broadband services has attracted investments across a wide range of infrastructures, including:

- Fixed and mobile networks.
- Cable, terrestrial and satellite TV networks.
- Buildings, towers, physical structures, power plant and other supporting services for ICT infrastructures.
- Data centres and internet exchange points.
- Customer service centres and retail shops.
- Investments and business models linked to connectivity – e.g. smart cities, vertical industry sector partnerships, logistics, content, data analytics, internet of things (in the light of 5G and its potential).

The survey found respondent interest in all these types of infrastructure, from existing players and new entrants. The larger network operators continue to provide a full range of broadband services, while others emerge as specialist investors, for example tower companies, data centres and internet exchange points, focussing on one investment type.

Smarter investment strategies

Greater competition is resulting in both existing companies and new entrants seeking new ways to make investments more efficient. The lowering of unit costs in the supply in broadband services markets is needed to maintain profit margins. In the EU, policy makers and regulators have promoted specific cost reduction measures for broadband investments[9,10,11,12], including:

- The efficient use of wholesale markets in the telecommunications sector.
- The liberalisation and fairer pricing of spectrum.
- Removing sector-specific taxation.
- Greater coordination of civil works and access to multi-occupancy buildings.
- Cost and infrastructure sharing models including joint investments and public-private partnerships.

These newer policy and regulatory measures, although also being adopted by non-EU countries, have not yet had significant impact on investment efficiency outside the EU. All countries are facing the same investment needs, driven mainly by the significant growth in broadband services demand and often alongside national policy directives towards achieving universal high-speed broadband connectivity.

Policy, legal and regulatory frameworks are gradually being adapted to these new demands, in some countries faster than in others. This survey has sought to identify the main remaining obstacles to efficient investments in broadband infrastructure in each country.

The important next wave of ICT infrastructure investments has already been foreseen in all the countries surveyed. Mobile services will be enhanced by 5G technologies which will include many more applications around the "Internet of Things" and other, not yet fully defined, digitally enabled business and service models. In the fixed broadband market, fibre access investments will grow to meet the faster (and more reliability dependent) data services requirements of businesses and households. Fixed access services will be enhanced by fibre-based local networks which are better suited to the higher capacity and reliability needs of broadband users.

The range of business models required for these new investments are likely to involve more collaborative approaches. Greater cooperation will not just be between the operators and service providers in the ICT sector. New ventures span different market sectors, including telecommunications with healthcare, education, agriculture, logistics, public sector management, transport, entertainment, manufacturing, supply chain and many other industrial sectors.

[9] https://ec.europa.eu/competition/sectors/telecommunications/overview_en.html

[10] https://ec.europa.eu/digital-single-market/en/cost-reduction-measures

[11] https://ec.europa.eu/digital-single-market/en/content/eus-spectrum-policy-framework

[12] https://ec.europa.eu/taxation_customs/business/vat/telecommunications-broadcasting-electronic-services-archived_en

Smarter investment models designed for this greater collaborative investment world are continuing to emerge. In the view of the respondents, the makers of policy, laws and regulations will need to engage fully with the sector and be seen as better facilitators for these new types of smarter investments.

The way forward

The required new investments in ICT infrastructure will require new and more collaborative challenges to be met. The sector's collaboration experience has so far not been good, evidenced by the many examples where each operator invests in separate civil works, separate parallel network capacity and separate transmission masts. Greater cooperation would have saved investment funds that could have been used to expand and improve access more. Fierce competitive pressures appear to have prevailed over the economic good sense of cost reduction. Collaboration between operators has not yet become normalised.

The collaboration experience between policy makers and the sector players has also not been good. Governments still expect to receive high fees for spectrum resources, diverting investment funds away from achieving the policy aims of better infrastructure and a more universal access. In some countries, taxation schemes targeting the sector still seek to extract maximum payments from telecommunications and internet providers, further limiting their capacity to make investments in ICT infrastructure. In addition, there are still inconsistent and time-consuming administrative procedures for obtaining network construction permits and access to rights of way.

Structural influences from the next wave of investments

"Digitisation is also fostering cross-industry interaction; telecommunication operators should be the landmarks in enabling other industries along their digitisation journeys.

"New high-speed networks and next-generation quality of services features are increasingly becoming the main drivers for digital growth, but still the business equation is not yet solved to unlock wide roll-out of fibre-to-the-premise and upcoming 5G development."

"Beyond the evolving roles for established players, a multitude of start-ups are leveraging the Internet of Things (IoT) to create a new business model and domain for business.

"Most successful IoT use cases would not be implemented by single players alone, but with agreed roles together in partner ecosystems. Right ecosystems are a major driver of IoT success"

[Source: AD Little 2019 Report "(IoT) breakthrough – Is the industry ready for commercial success?"[13]]

Recommendations are made in this report, based on our survey of investor perceptions. These recommendations aim to reduce the most important barriers facing investors in ICT infrastructure. Most of the recommendations are based on best practices already in place in other countries, notably in the EU. In some of the countries surveyed, these best practices may have already been identified and moves are being made to adopt them, but implementation has so far been slow or has stalled altogether.

The recommendations in this report are therefore designed to inform priority-setting activities by policy makers and ICT sector regulators as they aim to make investment conditions better in readiness for the next wave of ICT infrastructure investments driven by rapidly growing and extending markets for broadband services.

[13] https://www.adlittle.com/en/who-dares-wins

2: SURVEY METHODOLOGY

Taking an investor's view

The previous (2008, 2012 and 2016) EBRD assessments studied the legal and regulatory conditions applying to the electronic communications sector in a wide variety of national markets. Investors take into account many factors before they decide whether to invest or not.

For the 2020 survey, we have recorded directly the views of a wide range of existing and potential stakeholders in investment in broadband infrastructure and service, including finance providers, telecommunications network and service operators, broadband and internet service providers, analysts and other market stakeholders. "Broadband investment" embraces telecommunications infrastructure and connectivity (fixed and mobile networks) and the services (both retail and wholesale) that are delivered over these networks (voice, internet, data, media and broadband services). This definition is used within the context of the key purpose of this survey – to promote broadband infrastructure investments.

In addition, the survey team has researched and held wider discussions regarding the overall policy, legal and regulatory conditions used by the relevant authorities in each country. In this way, we have attempted to match the effectiveness of the relevant conditions in each country to investor needs.

Stakeholders generally use benchmarks to compare the conditions in their country alongside the conditions achieved in neighbouring countries and regions, notably the EU. The EU is generally perceived to be an open and effective marketplace for ICT investments. The EU's current legal and regulatory framework ("The European Electronic Communications Code"[14]) is viewed by investors as an enabler to overcome the most commonly faced problems in the competitive ICT markets.

Other factors are used in our surveys that could be useful to investors in deciding on which countries to focus on now and in the future. The most important of these other factors are the relative achievements, expressed in terms of each country's current standing in published world rankings. For example, the International Telecommunications Union (ITU's) ICT Development Index and world rankings are used alongside their published data for fixed and mobile broadband penetration and internet usage. [15].

Respondents' views of the policy, legal and regulatory enablers for broadband infrastructure investment have led us to identify the gaps in policy implementation. The action areas required for each country are shown in the results Section 3 of this report.

What are the components of the survey?

The main purpose of the survey is to use the results to inform investors, policy makers, regulatory and other influencers of sector investment to increase effectiveness in telecommunications sector investments and in particular to improve broadband infrastructure coverage, capacity and connectivity.

Confidentiality

To allow for candid and forthright responses, the answers provided and views expressed by the respondents to this survey are treated in strictest confidence by the Bank. None of the overall results, or any part thereof are attributed to any organisation, group of organisations or individuals. The Bank will publish the main results to benefit investors, policy makers, regulators and other sector players, making it clear where actions need to be taken to improve the climate for sector investments. This will be done without breaching the confidentiality of the persons and organisations that expressed their opinions during the survey.

[14] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L1972&from=EN

[15] https://www.itu.int/dms_pub/itu-s/opb/pol/S-POL-BROADBAND.20-2019-PDF-E.pdf

Respondents were asked to make a separate response for each country where they are familiar. Their knowledge of the country could be either by their existing presence, or by their having studied the market for possible investment in the sector in that country. The countries being analysed include the following: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Croatia, Egypt, North Macedonia, Georgia, Jordan, Kazakhstan, Kosovo, Kyrgyz Republic, Moldova, Mongolia, Montenegro, Morocco, Serbia, Tunisia, Ukraine and Uzbekistan. This report covers five countries of the SEMED region: Egypt, Jordan, Lebanon, Morocco and Tunisia

The survey sought opinions on the market for broadband investment from several overall viewpoints:

- Market attractiveness - what is perceived about the market size, potential and attractiveness for investments?
- Investment risk factors - including sector policies, the general and specific legal and regulatory frameworks, public and private sector cooperation, availability and quality of input resources including spectrum, labour and rights of way, taxation, trade policies and political stability.
- Best practice potential – what level of confidence do investors have in the country moving towards best practices for the sector?
- The following sections define these various factors and how they are used and reported in the survey.

Market attractiveness and investment risk factors

Respondents were asked to indicate, when they are making investment decisions, what was the relative emphasis they place on the pure market factors on the one hand and the investment risk factors on the other. The results for the SEMED countries were; pure market factors; 53% and investment risk factors; 47%.

Additionally, a number of factors relevant to investments in the ICT sector are included in the survey. Each factor and its components and weightings are described in the table below.

<table>
<tr><th>Survey factor</th><th>Components</th><th>Weightings</th></tr>
<tr><td>Perception of market attractiveness</td><td>Respondents are asked, for the types of investment that they are involved in, -what is their view, for each country, of the overall market potential, regardless of the investment conditions and risks there?
Respondents are asked to add comments to support their views.</td><td>53%</td></tr>
<tr><td>Investment conditions, risks and related factors</td><td>In this part, 14 potential risk factors are listed. Each could influence investment decisions in each country. Respondents were asked to give their view separately for each listed factor and for each country.
Respondents are asked to add comments to support their views. These comments could be on any of the listed topics or other areas of the situation, ranging from “examples of best practice” right through to “examples of any key inhibitors and barriers to investments”.</td><td rowspan="2">47%</td></tr>
<tr><td colspan="2">The list of 14 potential risk factors identified for the broadband market</td></tr>
<tr><td colspan="2">1. The country's overall legal system, predictability and process
This factor covers the overall national legal system and its enforcement, the effectiveness of public authorities, the risk of overlaps, duplications and inconsistencies.
2. Legal and regulatory framework specific to electronic communications and broadband investments
This includes the existing overall legal and regulatory framework (primary and secondary legislation/ by-laws) relating specifically to the electronic communications networks and services sector, your confidence in the effective application of those laws and the transparency of the procedures used by-law makers and regulatory bodies in supervising those laws. The types of laws and regulations for the sector are typically related to the rights and obligations of market participants, interconnection and access, sector competition, conditions for the provision of services, technical standards and any specific rules for promoting investments.
3. State participation in the sector
This includes the level of state ownership of networks and service operators and the possible implications for competition, for example the possible bias that could result in applying policies, laws and regulations.</td><td></td></tr>
</table>

4. **State assistance and funding schemes** This includes any funds that are available to investors for assisting electronic communications networks and services expansion or for ensuring universal service (for example rural development funds, digital society/ information society development funds, broadband infrastructure funding) and the related rules and procedures applying to such funding with relation to the related conditions for state participation, open access, distortion of competition etc. 5. **Quality of databases and access to information** This includes the existence and reliability of relevant information sources for population distribution and other relevant national statistics as well as specific databases for licence-holders in the sector, interconnection offers, network infrastructure atlas, index of relevant laws and regulations. 6. **Availability of labour especially with digital skills** This includes the labour and skills required for network construction and operations, customer service and business management. 7. **Labour regulations, employment agreements, militancy, disruptions** This relates to the national or sector specific conditions for employing labour in support of investment and operations, including the risk of strikes or other disruptions outside the control of the investor, for example through organised labour campaigns generally or directed at the sector specifically. 8. **Access to state-controlled resources related to investment in networks and services** This includes the access to, and the procedures used in frequency spectrum, numbering ranges or any other types of networks or services licences or authorisations required before launching new services or growing existing services. 9. **Certainty in construction permits or wayleaves** This includes any required approvals for physical construction or civil engineering works and the placing of plant on public or private land (including masts, towers, poles, overhead wires, ducts, manholes, operational or other buildings, street furniture etc.). 10. **Taxation generally or targeted at the sector** This includes the general taxation applied to businesses and individuals plus any specific taxes or additional financial burdens placed on trading in the electronic communications sector, the collection of services revenues or on the outlay of investment or operating costs. 11. **Overall infrastructure** This relates to the national and local infrastructures for road transport, electric power distribution, and other utilities essential to the normal operation of electronic communications networks and services. 12. **Trade barriers** This includes any trade barriers or specific trade tariffs (generally or related to the sector), ownership restrictions, profit repatriation, currency risks. 13. **Political stability, security, criminality, terrorism** This relates to any aspect that threatens your overall presence in the country from danger to life and personal safety or the overall climate of adherence to rule-of-law and the general level of criminal threats against businesses, residents and visitors. 14. **Corruption generally or in any aspect of operations** This relates to the likelihood of corruption affecting investments or operations, either through the taking of bribes in return for specific assistance or through systemic corruption applied generally in contravention of relevant laws and regulations. **Any other aspects that are not mentioned above** A section where the respondent can add any other investment related risk factor not covered above, including a view that one of the above factors is overriding in their decision whether or not to invest.	
For each factor (market attractiveness plus the 14 potential risk factors), a rating is given by choosing one of the following categories: • Positively encourages investment • Does not deter investment • Mildly deters investment • Strongly deters investment • No opinion.	100% Total weighting

Progress towards the adoption of best practice

An additional part of the survey concerns the levels of confidence that respondents have regarding the country's movement towards best practice.

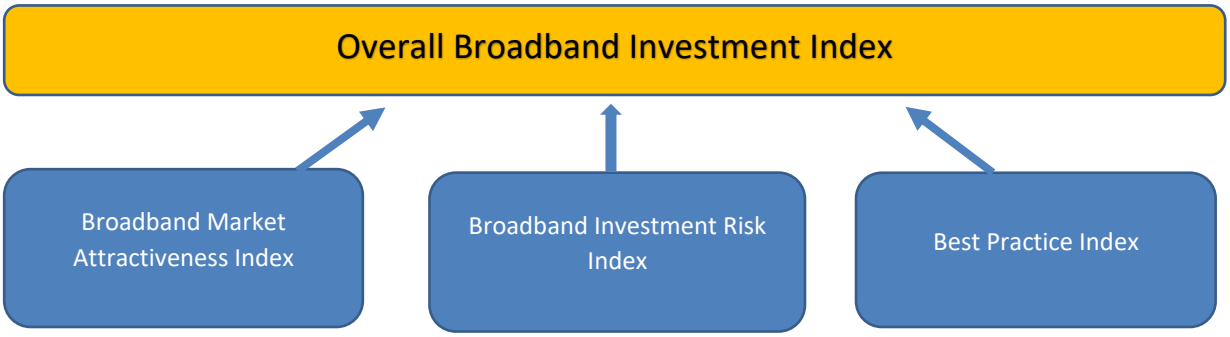
Survey factor	Components
Confidence in moving towards best practice	Respondents are asked to rate the confidence that they place on the country's policy makers/regulators etc. being motivated and able to improve towards implementing best practice conditions for investors.

The level of confidence is measured by choosing one of the following categories:

- Very confident
- It could happen within reasonable time
- Some doubts that it will happen at all
- Strong doubts / Unlikely ever to happen
- No opinion

The methodology for calculating the overall Broadband Investment Risk index

The main index proposed for the overall ranking of countries is the Overall Broadband Investment Index. Its calculation combines the results of three sub-indexes, the Broadband Market Attractiveness Index, the Broadband Investment Risk Index and the Best Practice Index.



The Overall Broadband Investment Index therefore seeks to measure factors associated with the attractiveness of the market, the perceived barriers to investing in that market and the potential for the country to improve the investment climate by removing the barriers.

The resulting Index is normalised so that the maximum possible value is 100 and the minimum value is zero. The ranking of countries according to their Overall Broadband Investment Index will therefore show which countries are perceived more positively or less positively by respondents.

Component Index 1: Calculating the Broadband Market Attractiveness Index for each country

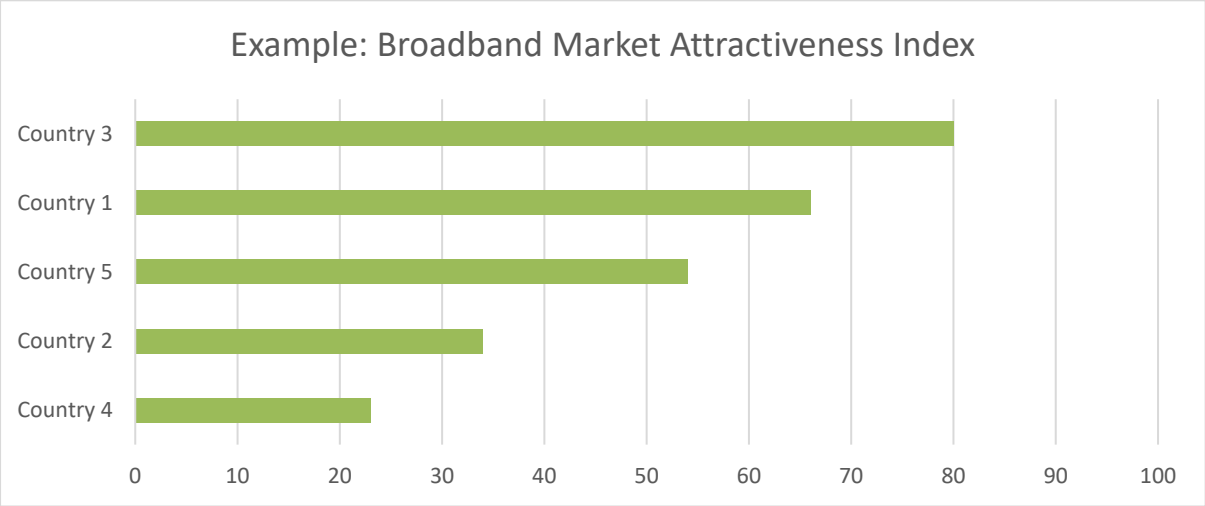
The Broadband Market Attractiveness Index for each country is calculated from the average of responses to a specific question: *"For the types of investment that you are involved in - what is your view, for each country, of the overall market potential, regardless of the investment conditions there?"*

The respondent is asked to choose one response from five options:

- Positively encourages investment
- Does not deter investment
- Mildly deters investment
- Strongly deters investment
- No opinion.

The average result for each country is calculated by adding the total scores from all responses for that country and dividing by the number of responses.

The resulting Index is normalised so that the maximum possible value is 100 and the minimum value is zero. The ranking of countries according to their Broadband Market Attractiveness Index will therefore show which countries are perceived by respondents to have the most intrinsically attractive markets and which are less attractive.



On the comparative scale, zero would indicate a perception that the broadband market has no attraction. A score of 100 would indicate a perception that the market potential is perfect.

Component Index 2: Calculating the Broadband Investment Risk Index for each country

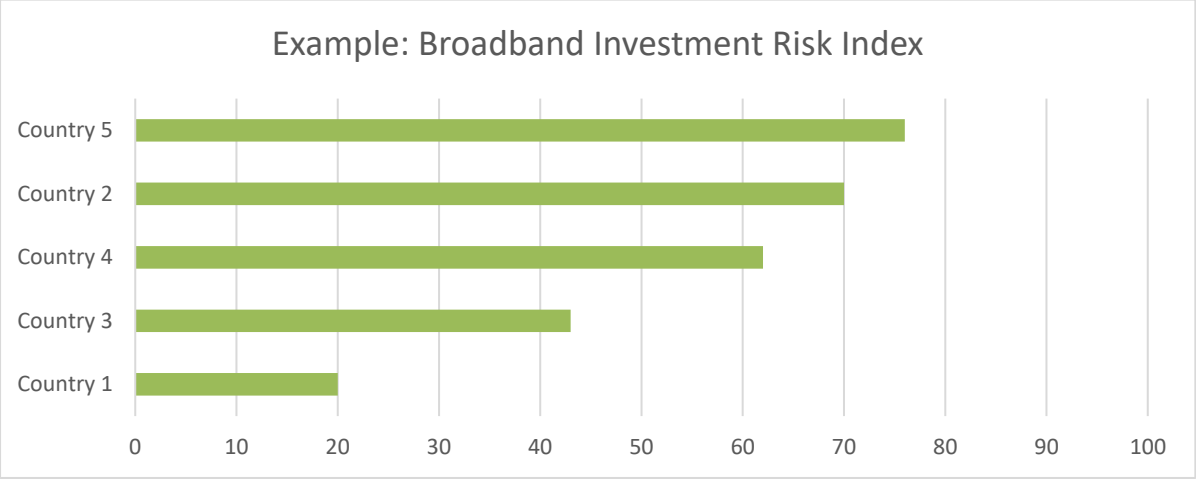
The Broadband Investment Risk Index for each country is calculated from the average of responses to a section of the questionnaire which lists 14 relevant investment risk factors. For each factor in turn, the respondent is asked "*In this part, we go through a list of 14 factors, which could influence investment decisions in each country. Please give your view separately for each listed factor and for each country.*"

The respondent is asked, for each of the 14 factors in turn, to choose one response from five options:

- Positively encourages investment
- Does not deter investment
- Mildly deters investment
- Strongly deters investment
- No opinion.

The average result for each country is calculated by adding the total scores from all responses from all 14 questions for that country and dividing by the number of responses to all questions.

The resulting Index is normalised so that the maximum possible value is 100 and the minimum value is zero. The ranking of countries according to their Broadband Investment Risk Index will therefore show which countries are perceived by respondents to be the least intrinsically risky and which markets have most risk.



On the comparative scale, zero would indicate a perception that the broadband market has no enabling policy or has other absolute barriers and risks to investment. A score of 100 would indicate a perception that the full implementation of policies, legal and regulatory frameworks and other enabling conditions are already in place leaving no barriers or risks to investment.

Component Index 3: Calculation of the Best Practice Index for each country

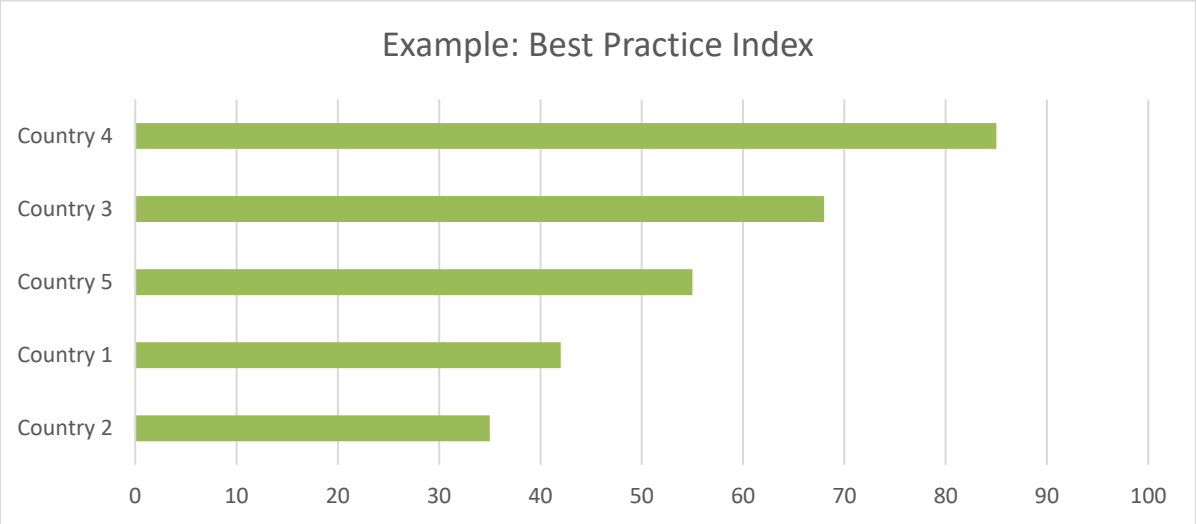
The Best Practice Index is calculated by using the responses to the specific question: *"Please rate the confidence that you place on the country's policy makers/regulators etc. being motivated and able to improve towards implementing best practice conditions for investors."*

The respondent is asked, to choose one response from five options:

- Strong doubts / unlikely ever to happen
- Some doubts that it will happen at all
- It could happen within reasonable time
- Very confident
- No opinion

The average result for each country is calculated by adding the total scores from all responses and dividing by the number of responses to all questions.

The resulting Index is normalised so that the maximum possible value is 100 and the minimum value is zero. The ranking of countries according to their Best Practice Risk Index will therefore show which countries are perceived by respondents to be more likely to move towards better conditions and which are less likely.



A value of zero would indicate that the country has no best practices relating to broadband investment conditions. A score of 100 would indicate that the country has already adopted all relevant best practices.

Calculation of the Overall Broadband Investment Index for each country

The Overall Broadband Investment Index (BII)c for a country is a composite index that combines the Broadband Market Attractiveness Index (MAI)c, the Broadband Investment Risk Index (IRI)c and the Best Practice Index (BPI)c for the country, according to the formula:

(BII)c = 0.67 x [Wm x (MAI)c + Wr x (IRI)c] + 0.33 x BPIc

Where,

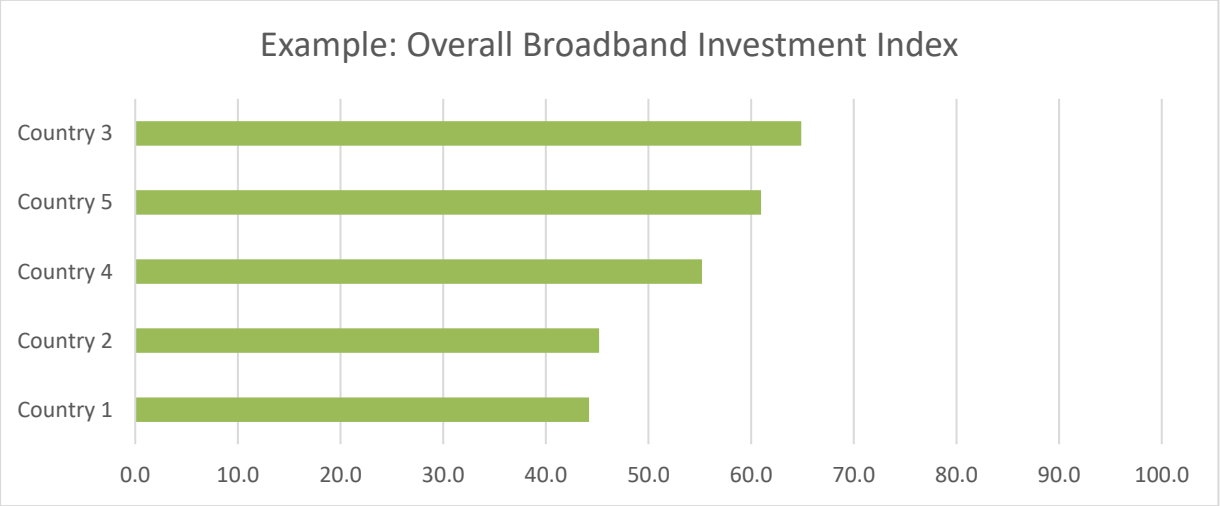
Wm= weighting applied to the Broadband Market Attractiveness Index (MAI)c for the country

Wr= weighting applied to the Broadband Investment Risk Index (IRI)c for the country

BPIc = Best Practice Index for the country

And Wm + Wr = 1

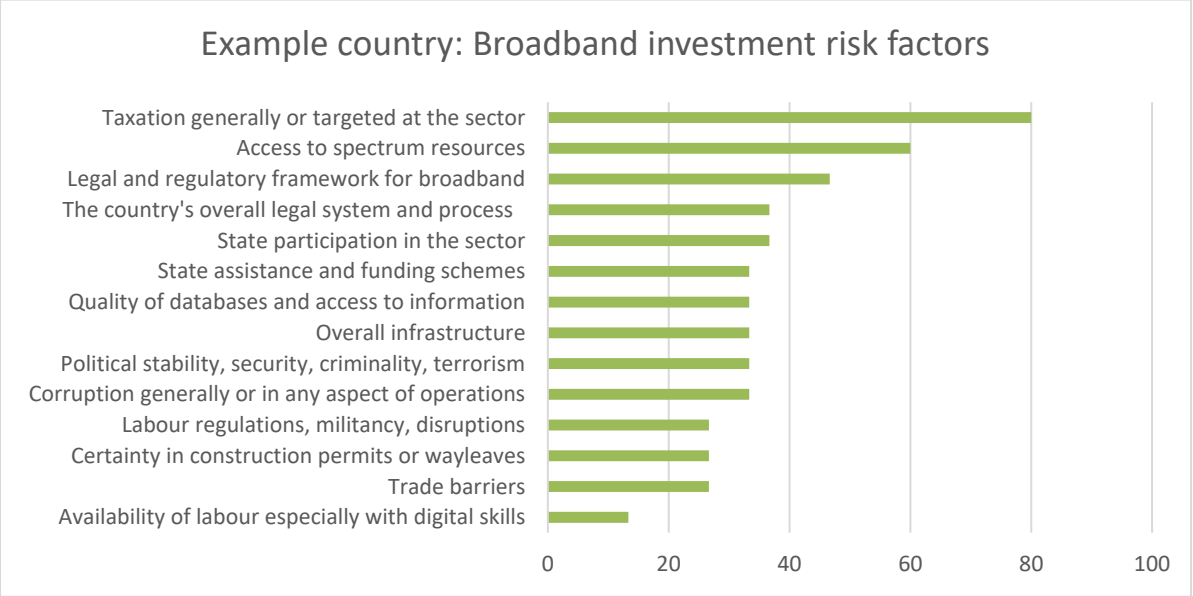
The values of Wm and Wr are derived directly from the aggregated results (average of all respondents for all countries) to a specific question in the survey. Respondents are asked to judge how much relative weight that they place on pure market attractiveness factors on the one hand and investment risk factors on the other hand. For the SEMED countries, Wm has a calculated value of 53% and Wr is 47%.



On the comparative scale, zero would indicate a perception that the investment climate is very poor. A score of 100 would indicate a perception that the overall conditions are perfect for investment.

The above example results show that Country 3 has the best conditions for broadband infrastructure investment, despite there being relatively worse perception of the risks involved for Country 3. Country 5, despite being perceived as less attractive in pure market terms, has the best risk profile and reasonable potential to adopt best practices. Country 4 has the lowest market attractiveness but there is good confidence that it will soon adopt best practices. Countries 1 and 2 are relatively unattractive.

The next step is to reveal the factors that most significantly influence the investment risk in each country and therefore to indicate the key areas of policy that need to be tackled in order to improve investment conditions. This important result as obtained by ranking the responses to the 14 factors that make up the Broadband Investment Risk Index.



A score of zero for any factor would indicate that the factor has no influence at all on investment decisions, a maximum score of 100 would indicate that the risk associated with the factor is so high that it completely puts off any investment.

In this example, the three priority factors that most hinder investments are high taxation on the sector, poor spectrum access and limitations in the legal and regulatory framework. The remaining factors, although contributing to the overall investment conditions, are less important in the eyes of the respondents.

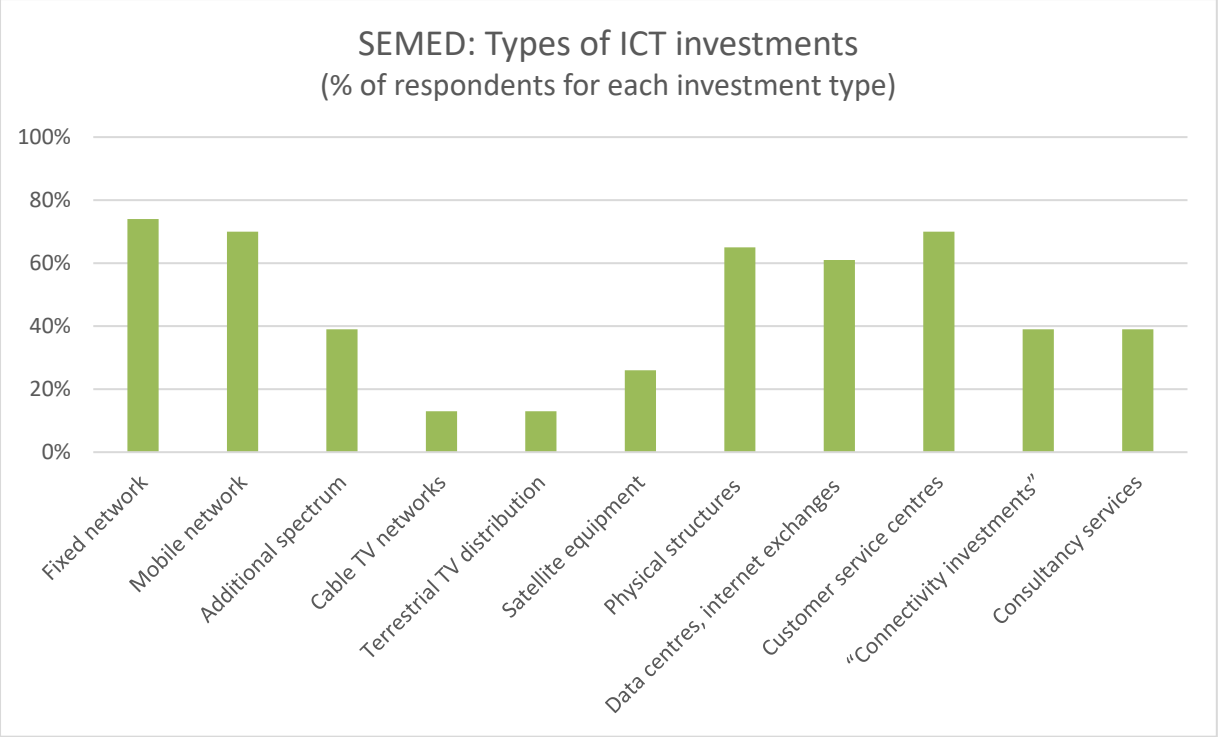
3: SURVEY RESULTS

Types of investments

The SEMED countries are following the main global ICT infrastructure investment trends, but with the main investments being more heavily skewed toward mobile rather than fixed network infrastructures. On average, the take-up of mobile broadband services in the five SEMED countries outnumbers fixed broadband by over seven to one.

Infrastructure assets include the sector specific cabling and switching equipment, almost all of which is imported by the countries surveyed, plus the physical infrastructures - mainly buildings, ducts and towers plus customer service centres (including retail shops). The more traditional investments in TV networks, including cable and terrestrial distribution plus satellite communications equipment, are becoming limited to specialist players.

Most major players still prefer owning their own fixed and mobile infrastructures, rather than renting capacity from other infrastructure owners, or sharing infrastructures with their competitors. The extent of infrastructure sharing, or joint investments is still limited, even though these forms of collaboration would lead to significant cost reductions. But, as one survey respondent revealed *"When you are in a high margin business, cost reduction is not a priority"*.



Of growing importance in a market now dominated by broadband services are investments in data centres, which include storage capacity for the fast-growing use of "cloud" services. For example, one fixed and mobile operator in Morocco is currently investing in the largest data centre in the country.

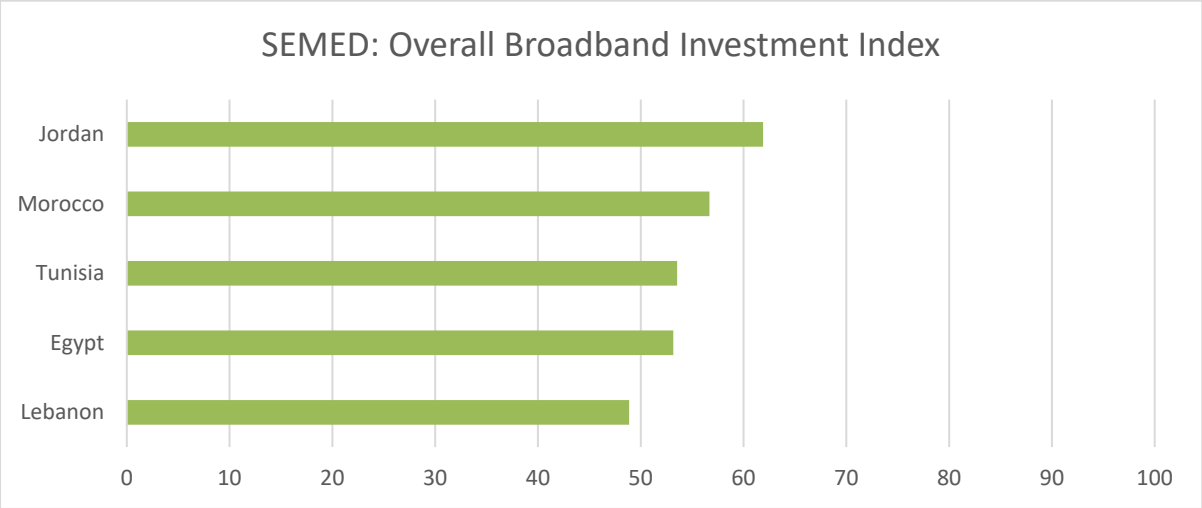
Data services growth has risen very sharply in all countries, as the number of internet users (currently averaging around 60% of the population) increases. Consumer appetite for higher broadband speeds continues to develop as 4G mobile services are being extended.

There is a firm interest in additional spectrum investments, particularly for 5G, with the expected demand for a range of new business models linked to connectivity – e.g. smart cities, vertical industry sector partnerships, logistics, content, data analytics and the "Internet of Things". However, all mobile service providers in the five SEMED countries are currently mainly concerned with achieving results from their investments in 4G infrastructures.

ICT market players are starting also to offer consultancy services to enhance their ability to offer full ICT solutions, rather than just individual voice and internet services.

Overall respondent perception

The overall Broadband Investment Index result for the SEMED countries is shown below.



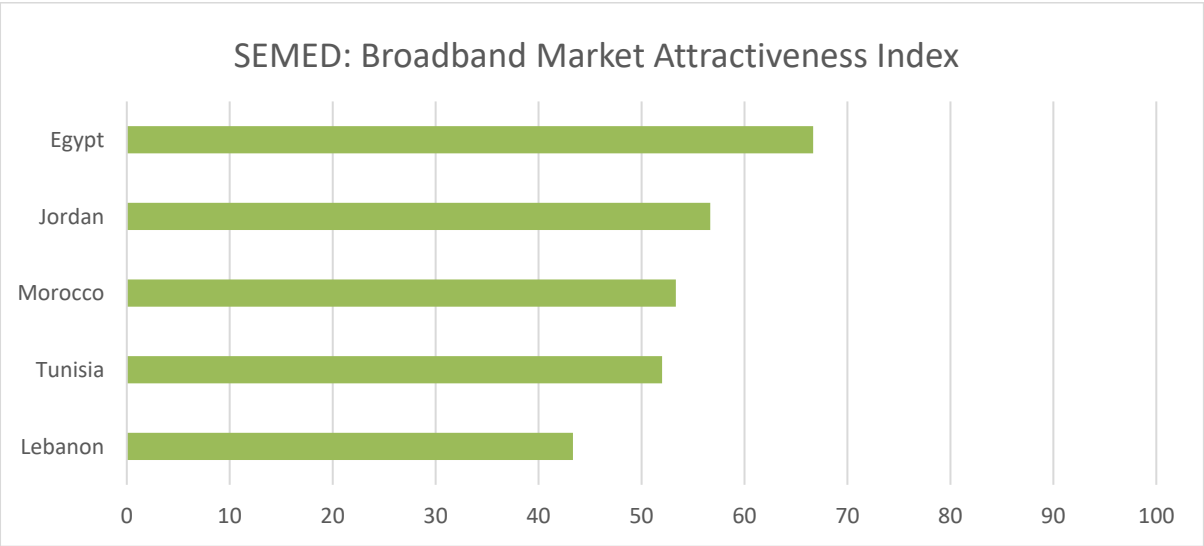
On the comparative scale, zero would indicate a perception that the investment climate is very poor. A score of 100 would indicate a perception that the overall conditions are perfect for investment.

The chart shows that in all SEMED countries, the conditions are a long way short of what respondents would ideally wish for.

The Overall Broadband Investment Index has been calculated from several components; market attractiveness, investment risk and confidence towards adopting best practices. The full list of component factors and the calculation methodology for each index are detailed in section 2 of this report.

Market attractiveness

The Market Attractiveness Index result for the SEMED countries is shown below.



On the comparative scale, zero would indicate a perception that the broadband market has no attraction. A score of 100 would indicate a perception that the market potential is perfect.

Based on the respondents' views, Egypt is the most attractive of the SEMED broadband markets and Lebanon the least attractive. For this component, the survey participants were asked to rate only the pure market potential, disregarding any investment risk factors, which are only taken into account in the next component. Both the market attractiveness and the risk factors are combined to calculate the overall Broadband Investment Index.

The main market benchmark indicators of the ICT markets in the SEMED countries are shown below.

SEMED: Market headlines

Market indicator	Egypt	Jordan	Lebanon	Morocco	Tunisia
Population	100m	10.1m	6.9m	36.5m	11.7m
Penetration of fixed broadband/100 population	5.4	4.7	21	3.9	8.8
Penetration of mobile broadband/100 population	50	104	57	58	81
% of population using the internet	45%	67%	78%	65%	64%
ICT Development Index (world ranking)	103rd	70th	64th	100th	99th
Average download speed per fixed broadband user (Mbps)	26.52	50.53	8.10	18.52	9.12
Average download speed per mobile broadband user (Mbps)	16.89	17.74	46.69	33.57	25.32
Forecast overall broadband market growth up to 2023 (% compound growth per annum)	17%	3.4%	5.8%	13%	6.0%

[Sources: United Nations, ITU, Speedtest Global Index, Fitch Solutions]

Egypt is the largest market by population and is also forecast to be the fastest growing market for broadband services, from the lowest current base. Morocco is the second largest market by population, with the second-best forecast broadband growth rate, also from a low base. All five countries have relatively low positions in the overall world rankings for ICT development, although Jordan and Lebanon appear to have made some progress in improving their position.

Jordan and Lebanon are relatively small markets, but with relatively high standing in internet usage. Jordan already has high mobile broadband penetration, while its relatively expensive fixed broadband prices contribute to relatively low fixed broadband penetration. Jordan's forecast for broadband growth remains the lowest of the five countries. The average broadband speed test results show that the highest users are Jordanian fixed broadband subscribers, followed by Lebanese mobile broadband users. Relatively low speed usage is recorded by fixed broadband subscribers in Tunisia and Lebanon. The countries with the highest average download speeds also have the lowest fixed broadband penetration, showing that in these markets, the big users are purchasing fixed broadband.

In summary:

- Egypt has the highest broadband market size and the highest potential growth. The country remains relatively underdeveloped in ICT terms. Egypt has the lowest average download speeds for mobile broadband.
- Jordan is a relatively small market with already high mobile broadband penetration. The penetration of fixed broadband is very low, but these users have the highest average download speeds.
- Morocco has a good market size with a well-established fixed broadband market. The main potential appears to be in mobile broadband growth.
- Tunisia has reasonable size and relatively good broadband penetration, but with only modest growth potential compared with Egypt and Morocco. Tunisia has the lowest average download speeds for fixed broadband users.
- Lebanon is a small and declining market by population, but with an already well-established fixed broadband market. Lebanon has the highest average download speeds for mobile broadband users but the lowest download speeds for fixed broadband. ICT is relatively well-developed, and growth can be expected especially from the mobile broadband market.

SEMED countries: Market attractiveness summary

Market attractiveness factors	Egypt	Jordan	Lebanon	Morocco	Tunisia
Overall size of the market, in population terms and relative spending power					
Growth potential of the market, in terms of demand for broadband-services					
Efficiency of the markets in terms of fair competitive conditions					
A clear national ICT market strategy for the country with stated ambitions and goals, for example targets for broadband coverage and take-up					

 - Good /  - Medium /  - Poor

Investment risk factors

The survey sought views on a number of factors relating to sector investment risks. These factors ranged from the general and specific policy, legal and regulatory frameworks applying to sector investments, to the public sector participation, the availability of digital labour skills, the procedures for granting construction and rights of way permits, overall supporting infrastructures, overall political stability and levels of corruption. A more detailed description of these risk factors is given in section 2 of this report.

Respondents were asked how important these risk factors were in their investment decision making, alongside the pull of market attractiveness. The results across a wide range of respondents gave an average relative weighting:

Balance of factors in deciding investment in a country

Respondents were asked to assess the relative weighting that market and risk factors hold when deciding to invest in a country. The results were:

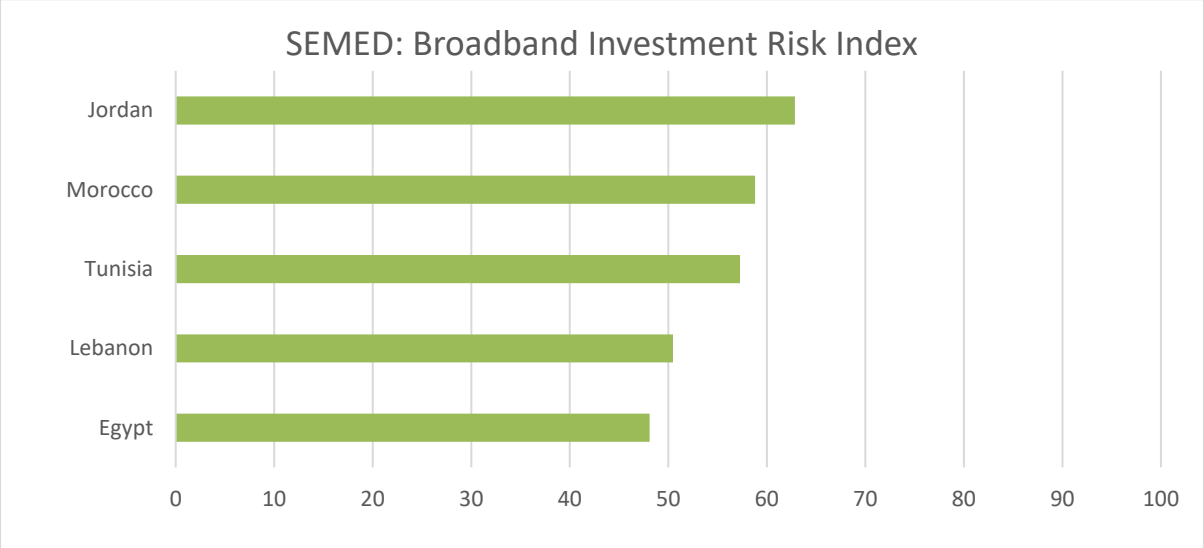
Pure market potential: *Average response 53%*

Investment-related risk factors: *Average response 47%*

Taken together, the various investment-related risk factors are therefore a key element (47%) in the decision making of respondents in broadband markets. The country-by-country results are given later in this section, leading to the identification of the most important risks facing respondents in each country.

Actions to reduce these investment-related risks are largely in the hands of policy and law makers in each country, together with the regulatory and other agencies charged with implementation of the policy and legal frameworks. The findings of the survey have enabled the measurement of the perceived risk faced by respondents, leading to an identification of the key policy and improvement challenges that need to be worked on to remove the obstacles that create the investment risks.

The measurement of these perceived risks has led to the calculation of a Broadband Investment Risk Index for each country.



On the comparative scale, zero would indicate a perception that the broadband market has no enabling policy or has other absolute barriers or risks to investment. A score of 100 would indicate a perception that the full implementation of policies, legal and regulatory frameworks and other enabling conditions are already in place leaving no barriers or risks to investment.

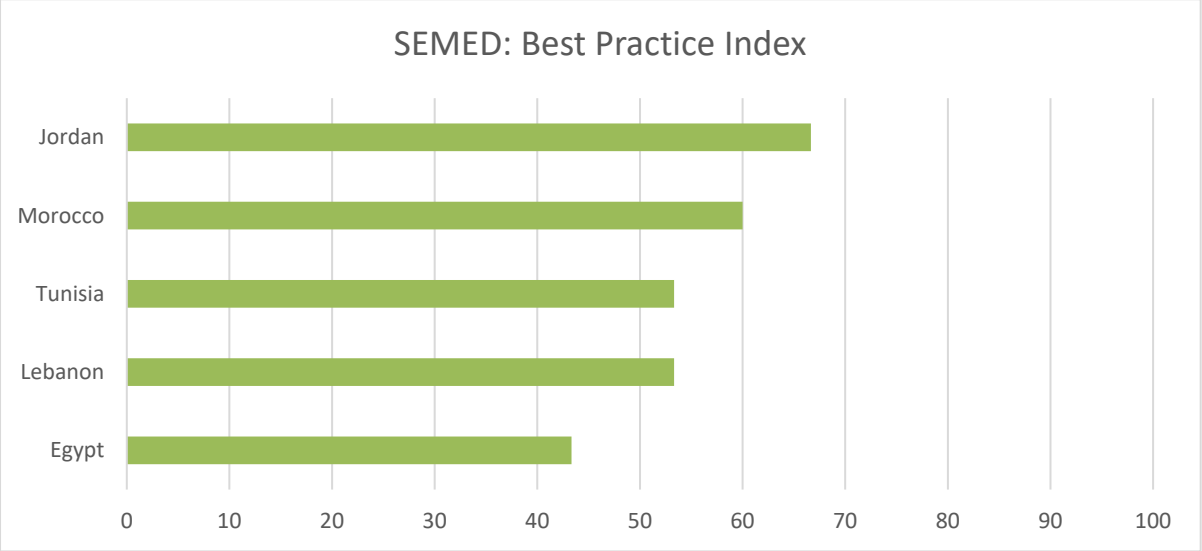
All the five SEMED countries surveyed fall short of implementing polices, legal and regulatory frameworks that would facilitate investments without barriers. The main obstacles are explored country-by-country later in this section. Jordan has the fewest barriers overall, having made most progress towards market liberalisation, with a range of competitive safeguards. Tunisia and Morocco have defined these safeguards, using the same EU market model, but progress with implementation has been slower. Lebanon's position is influenced heavily by its current political instability. Investment risk in Egypt is heavily influenced by the level of state ownership and influence in the sector.

Confidence in adopting best practices

The survey has measured the perceived risks associated with broadband investments, in the view of the respondents. These risks exist today but can be reduced significantly given action by policy and law makers together with the sector regulatory agencies.

The survey also asked respondents how confident they were about whether best practices will be adopted to reduce investment barriers within a reasonable timescale. For example, there are best practices now defined and being implemented throughout the EU member states regarding broadband cost reduction, including a range of procedures for joint construction, infrastructure sharing, access to multi-occupancy buildings and rights of way over public and private property. These measures have been defined to ensure that the cost efficiency and investment climate is as good as possible for putting in place the infrastructure for achieving universal high-speed broadband across the EU.

All the SEMED countries surveyed have problems in this area, creating significant barriers to investments including time delays and obstacles to coordination. For example, we were told that in Tunisia, it can take up to two years to obtain the necessary permissions to erect new masts using procedures that involve multiple paper form filling, inconsistently applied rules and bureaucratic delays. Best practice would be in place if the necessary applications could be made on-line via a one-stop-shop procedure, with all the layers of permission granting following the same effective procedures and timescales. These procedures are understood to have already started to be introduced for the largest urban areas in Morocco.



A value of zero would indicate that the country has no best practices relating to broadband investment conditions. A score of 100 would indicate that the country has already adopted all relevant best practices.

Jordan appears to be the fastest at adopting best practices for lowering investment barriers. Its legal and regulatory framework has followed the main liberalising steps already adopted by the EU. Jordan's current policy is to continue to harmonise with the EU's more investor-friendly laws and regulations. Morocco and Tunisia have the same overall harmonisation aims but are slower to implement the required steps. Lebanon is currently deadlocked by policy and regulatory inaction. Respondents have lowest confidence in Egypt's adoption of best practice adoption by the sector.

The following country-by-country sections examine the main investment barriers across the SEMED region, leading to the recommendations provided in section 4 of this report.

EGYPT

At a glance

Headline market statistics - Egypt	2016	current
Population (millions)	85	100
Fixed broadband penetration per 100 population	4.5	5.4
Mobile broadband penetration per 100 population	51	50
ICT development Index (world ranking)	100th	103rd
Internet usage (% of population)	36%	45%
Forecast overall broadband market growth up to 2023 (% compound growth per annum)	17%	

[Sources: UN, ITU, Fitch Solutions]

Egypt is the largest country by population of the five SEMED countries surveyed. It also has the lowest overall broadband penetration and internet usage. This is echoed in the relatively low ranking in ICT development. The forecast overall broadband growth rate is very strong.

Survey results

Egypt	Score	SEMED average	SEMED Ranking
Broadband Market Attractiveness Index/100	67	54	1st
Broadband Investment Risk Index/100	43	56	5th
Best Practice Index/100	48	56	5th
Overall Broadband Investment Index/100	53	55	5th

In general, an index above 50/100 indicates a relatively a good market for broadband investments.

The survey results show that Egypt is perceived overall to be the least attractive broadband investment market of the five SEMED countries surveyed. This is despite Egypt's position as the largest market by population, with the highest forecast growth rate for broadband, estimated to be 17% per annum average, making it the highest rated SEMED country in pure market terms.

What respondents are saying about the market

"The tough times in 2011 and 2013 hit many sectors. Everything halted for a time. Then government reforms started which were successful."

"Now the economy is under control and stabilised, Phase II of the reforms are underway."

"VAT has been introduced and the past subsidies to utility prices phased out. Now there should be structural reforms, focusing on infrastructure."

"Overall we have potential for growth and to grow the economy."

"The latest policy focusses on start-ups and facilitating government transactions through eGovernment."

"Incoming investment is not increasing because of uncertainty."

"In the ICT sector there is the digitisation of the network including competitive 4G roll out, national fibre access and fully digital smart cities etc."

"The overall number of fixed broadband lines in the country has risen significantly, but the private operators have lost market share."

"The new development areas are all fibre."

"On services, average revenues are low, but digital broadband has high growth potential."

"There is huge potential for growth in the broadband market. For the existing network there are plans to replace copper with fibre."

"What about rural areas? Telecom Egypt is digitalising its fixed network. But the consumers do not have credit. With the introduction of mobile payments, more demand will come for mobile handsets so that the fixed broadband market becomes less attractive."

"Overall voice revenues have been squeezed. Penetration is high, with the majority of users on prepaid terms. Data traffic is huge growth."

"There are some current tests by operators for 5G."

"Egypt is geographically well placed for international traffic and hosting of data storage and customer service centres."

"A couple of years ago it was tough. But now, the government is welcoming. Big demand, big potential. There are new laws and policies, with a direction towards attracting of foreign investment."

"There is a bankruptcy law, Chapter 11 like the USA, new investment law, civil servant laws."

"There is going to be a big focus on infrastructure - roads, ports, creating jobs. Electricity blackouts have now gone. These reforms will stop businesses leaving the country."

"ICT is a big sector now since 2018, with major focus and the launch of a satellite."

"For the new Cairo capital there are lots of opportunities for cloud and data centres."

"Datacentres are everyday news. Hot topic."

"There is big potential for datacentres."

"The reason that datacentres have not taken off? We don't know why, but it has not happened."

"Operators are interested in the connectivity, regardless of technology."

"There is a possibility that the regulator might offer new licence for connectivity, rather than infrastructure."

"Telecom Egypt is aggressive, but they are not impacting the mobile market. Customer perception of TE is of government and low quality. They are trying to be competitive on pricing. But the others can match and do better on quality.

"4G licences were very late, one of the. last countries globally."

"From a commercial perspective 5G is very challenging, we still need payback from 4G."

"Capex. and Opex. are now reducing as 4G roll-out is nearly finished. Mobile data traffic doubles annually, which will now drive heavy spending."

"For now, there is no appetite for 5G, so it may take time to offer 5G."

The overall Broadband Investment Index (right hand pillar) is calculated from the three indexes represented by the first three pillars. The full calculation methodology is given in section 2 of this report. For each pillar, the higher the score, the better the conditions are.

In contrast to its high market attractiveness, Egypt has a perception of high risk, as measured by the broadband investment risk index. The top concerns are the high level of state influence on the sector and the difficulties low in obtaining permissions for constructing broadband infrastructure, along with a number of other concerns. More detail is given in the section below regarding these investor concerns in Egypt.

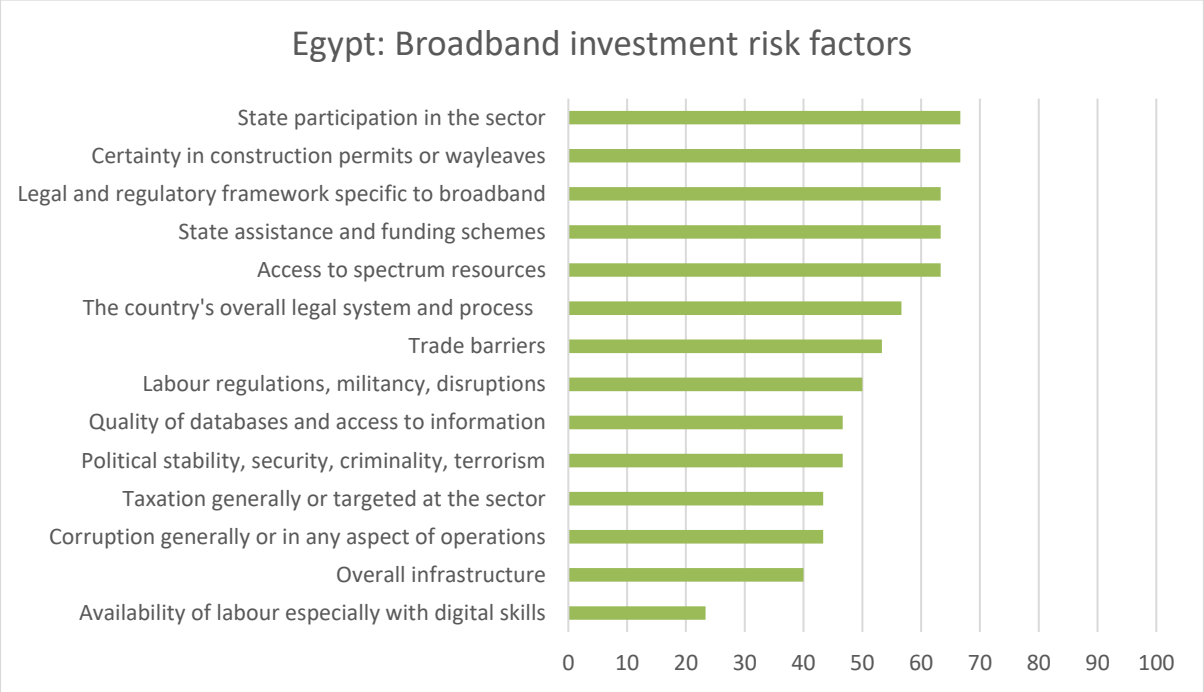
An additional factor is the level of confidence expressed by respondents regarding the adoption of best practice for the sector.

Respondent views

The survey considered 14 factors related to investment in ICT infrastructure. A description of these factors is given in section 2 of this report. Respondents were asked to express their view on whether the conditions for investment are affected by each factor in any of the following ways:

- Positively encourages investment
- Does not deter investment
- Mildly deters investment
- Strongly deters investment
- No opinion.

By assigning relative scores normalised to a scale of zero to 100, each factor has been ranked in terms of how much it contributes to investment risk.



A score of zero would indicate that the factor has no influence at all on investment decisions, a maximum score of 100 would indicate that the risk associated with the factor is so high that it completely puts off any investment.

The results show that in Egypt, respondents perceive that the high level of state participation in the sector, alongside a number of other concerns, make broadband investments significantly risky. The incumbent fixed network operator is 100% state-owned. The market leader in the mobile broadband sector is also partly state owned. Respondents also perceive that the difficulties in obtaining permits and rights of way for installing broadband infrastructure make investments difficult. These permissions are granted by state institutions and so there is a perception by the private sector respondents that publicly owned entities have an easier task in obtaining permissions, giving these entities a competitive advantage.

Parallel concerns are expressed regarding the legal and regulatory framework for the sector which has not restricted Telecom Egypt's significant market power. For example, alternative fixed broadband providers have recently experienced significant losses of market share. This competitive loss was claimed to be caused by the state funded replacement of copper-based broadband access networks with fibre without relevant accompanying competitive safeguards. The incumbent operator had previously allowed access by alternative broadband providers to its fixed copper network with good results for the market. The regulatory framework reportedly did not enforce the same access when the state-owned operator replaced copper with fibre, leading to very significant market share losses for independent operators.

In the mobile broadband market, respondents criticised the procedures leading to the granting of 4G spectrum licences. This has resulted in a low confidence in the prospects for good returns in the 4G mobile broadband market and in 5G investments in the future.

The level of control exercised by the state on the existing infrastructure, together with the state control over construction permits and spectrum resources, has crowded out alternative investments. The level of state influence has increased the risks facing independent investors such that instead of making investments in their own network infrastructure, the independent operators have largely relied on using the national, international and local infrastructure of the state-owned operator.

Other factors such as policy and regulation for trade, taxation and labour contribute less to investment risks.

There appears to be a good supply of skilled staff for the sector.

State control

How respondents expressed views about state control in the sector in Egypt

"There was talk of privatisation, but it is not going to happen."

"The infrastructure is owned by the government and Telecom Egypt."

"Telecom Egypt is government owned and uses its position to push out competitors on the fixed infrastructure broadband market."

"All competition is based on the incumbent's network, for mobile site backhaul, for fibre to the home."

"The government and regulator do not respond to the needs of competition."

"Telecom Egypt has its own mobile service and also owns 25% of the mobile market leader, so they are competing with each other."

"First the government privatises, then they step back in. Then they liberalise, then compete with themselves. This is not a strategy. Not a level playing field."

"The government wants to control. This is a highly sensitive issue."

"The cloud is kept within the country."

"There are only a small number of ISPs in Egypt, the state operator dominates."

"The government should implement new digital policies, joining the dots between new internet and media possibilities, infrastructure investments and value add by reforms to regulation, based on best practices from elsewhere."

"Foreign investment in Egypt has so far not met expectations. Foreign investors are nervous about the overall strong control exercised on the market from state ownership."

"The next phase of the necessary progress should be structural reform, a gradual lifting of subsidies plus social reforms to support the needy."

"All economic indicators are good. So why have FDIs not gone up so much? Why are we not exporting?

"There is a perception that the government and military crowds out the private sector."

"WhatsApp voice calls are restricted. The price of opening it up is loss of revenue. In general, websites aren't blocked, but some are."

"Investment in ICT is now going into a new phase. There is a plan for the state-owned operator to cover all Egypt. This will need a lot of finance."

"In the fixed broadband market, the network is monopolistic and supported by government. They used to allow alternative operators to use ADSL on their copper network, but now they have changed to fibre, this somehow does not work for the alternative operators. Technically it can work but they are being monopolistic."

"By blocking out the other operators, the incumbent now has 90% market share in fixed broadband, reducing the alternative operator shares from typically 30% each to single figures".

"Under their licences, alternative operators should have fibre access, but it does not work. Technically it can work but the incumbent just delays. They can switch it on, but it takes time, meanwhile they change the customer to their own service. Same experience with all operators."

"Fixed broadband ADSL wholesale fees to Telecom Egypt increased without justification."

"As a private operator, doing our own capex is too difficult."

"After much delay, the government were in a late rush for 4G because they needed foreign exchange."

"One of the barriers to growth of the internet market is the price of interconnection fee to get the international bandwidth to Cairo. Telecom Egypt sets the price and claim it is cost-based, but international benchmarks are much lower. These prices were set 15 years ago. Now makes up 90% of interconnection costs."

"Telecom Egypt is not willing to reduce interconnection prices because they might be accused by the Ministry of losing money."

"Telecom Egypt does not act commercially, they say the regulator sets the leased-line prices, but the regulator says that Telecom Egypt sets the price. The wholesale price was set many years ago."

"We have to use Telecom Egypt's network and they demand a full year's payment in advance. Our customers want to pay us monthly or quarterly. This creates cash flow problems for us, so we often have to turn down customer requests."

"We had a good market share on the ADSL market but now we are being squeezed out of the fibre access market. We have the right to interconnect with Telecom Egypt's fibre network but TE is unhelpful."

"*The regulator itself is not biased, when it comes to decisions, national security pervades*."

"It seems decisions are made to keep control of infrastructure, not to encourage business models."

"The state- owned operator will continue to dominate. They do not treat other operators as strategic customers."

"We have to use Telecom Egypt's infrastructure on their terms and under monopolistic conditions. The result is slow process and low quality at a price set by them and unchallenged by the regulator."

"There are only five licences, we don't see new entrants allowed."

"One complication is that the backbone is controlled by Telecom Egypt. So, whenever this is the case, further investments are always questioned by foreign operators."

It is clear that respondents are highly concerned that the level of state control reduces the willingness to invest. The market size and significant growth rate makes Egypt an inherently attractive market but there are significant concerns regarding the difficulties and risks with investments. From the respondents' viewpoint, state control is exercised in a number of ways:

- The limited number and scope of the licences issued. For example, there are very few internet service licences and there is low expectation that new licences for new investment opportunities (e.g. for tower construction) will be granted.
- The dominance and market power of the state-owned operator Telecom Egypt.
- The lack of regulatory intervention which would promote competition by limiting the significant market power of the state-owned operator, for example by improving wholesale access conditions and procedures.
- The lack of satisfactory procedures for alternative operators to obtain construction permits, making it difficult for infrastructure investments and resulting in over-reliance on the state-owned network.
- The state policy for Telecom Egypt to invest significant amounts in creating a national fibre backbone and access network without considering the role of private investment, thus appearing to "crowd out" private investments.

Permits for construction

How respondents express their views about the granting of permits in Egypt

"We wanted our own backbone, but we could not get permits."

"Telecom Egypt are not officially exempt from getting permits but they just get them. This is controlled by municipalities, maybe the military too."

"The state is investing in fibre to all parts of Egypt using Telecom Egypt. This is crowding out other private investments because only Telecom Egypt can get the permits easily to install fibre, leaving the competitors no choice but to use Telecom Egypt's infrastructure."

"Make it more equal. The procedure is known, but in practice you never get feedback. You have to have a large number of documents. For new compounds and communities, there is no problem, the problem is the existing network."

"It's the bureaucracy. A process that should take one day can take weeks."

"We would not install infrastructure if we could because it's too difficult and the returns. would be low."

"There may be a licence for a tower company, but practically it may not work. There could be big investments, but no decision has been made yet, maybe there are national security issues. There is a business model - it can work as everywhere else."

"We need more towers, shared towers. If you drive around, the call will interrupt because there are not enough transmitters."

"For the existing tower sharing mainly on highways, six towers cover maybe 30Km, so there are not enough towers. When there is a new road, there is a discussion to try and determine who is willing to build and who can share?"

The difficulties in obtaining permits appears to be only for the independent operators. Telecom Egypt appears to be able to obtain the required permits more easily. This further reinforces Telecom Egypt's market power. The alternative operators appear resigned to using Telecom Egypt's network to get access to customers. This dependence includes the use of Telecom Egypt's backbone network to reach mobile transmitter masts and the use of their fibre access networks to provide fixed broadband services.

The suggested ways to improve the situation include:

- The creation of independent entities, that can be granted special status for permits to operate joint infrastructures for all operators to use – there appear to be possibilities in Egypt for the creation of a "tower company". This move would be especially beneficial in the creation of the future mobile networks using 5G technologies, where a significant number of new towers will be required.
- The strengthening of the legal basis and the streamlining of procedures for obtaining permits (see also Recommendation 8 in section 4 of this report).

Spectrum

How respondents expressed their views on spectrum in Egypt

"The government issued new spectrum in 2016. 50% of the payment had to be in foreign currency."

"When the 3G licences were issued, they went to the highest bidders. The rules changed for 4G. It was offered to existing operators plus Telecom Egypt for an equal payment. The fee was a set, no bidding was allowed."

"The spectrum range was not convenient for 4G. The regulator got comments from operators on this but did not change their position."

"If you signed up for 100MHz of spectrum you don't get it."

"Technically speaking it should be like the USA etc. the trend should be to liberalise spectrum."

"5G spectrum is not going to be easy. 4G was a mess."

"We may have to exploit our existing spectrum usage rather than get new spectrum."

"The fear is that the regulator will ask for big money for 5G licences."

The method used for the last spectrum releases (for 4G in 2016) was viewed as a backward step from the "highest bidder" procedure used for previous spectrum awards. There was reportedly no investor involvement in the decision-making process for the spectrum band allocation, or the price paid, or the decision to award spectrum to the state-owned operator for the first time. With four holders of 4G spectrum and uncertain returns, the appetite in the sector for the expected 5G spectrum releases remains low.

If Egypt is to take full advantage of the expected transformational benefits of 5G and its related applications, then the procedures for awarding 5G spectrum need to be improved using a more liberalised, fair and transparent approach, taking account of the needs of the market (see also Recommendation 4 in section 4 of this report).

Other issues

How respondents express their views on other issues in Egypt

"There are still inconsistencies and uncertainties in the tax regime."

"The regulatory environment is quite tough, but it's better than before."

"Regarding termination rates on mobile. There has been a legal dispute since 2008 but now a financial settlement has been done. The regulator forced operators to agree amongst themselves."

"Staff are very skilled. We can get good people and we give them specialist training."

"We suffer from loss of staff, to foreign companies coming here and offering more pay."

"The law sides with employees, it's nearly impossible for us to fire them."

"A few years ago, there was no VAT for internet services, now it's applied."

"The growth of the voice market is very low. Any new mobile line includes 50 EGP state development fees. It used to be free provision. This fee goes to the state."

"There is a revenue share scheme and all operators have to pay 1% to the state."

"We used to have tax exemptions for companies to move to the smart village for 10 years, but this has now ceased."

"Now we must have a licence to import, for security reasons. For wireless transmission equipment we have to notify the regulator and it takes time to approve."

"Regarding the adoption of best practices, it's one aspect at a time, it depends on priorities.

Recommendations

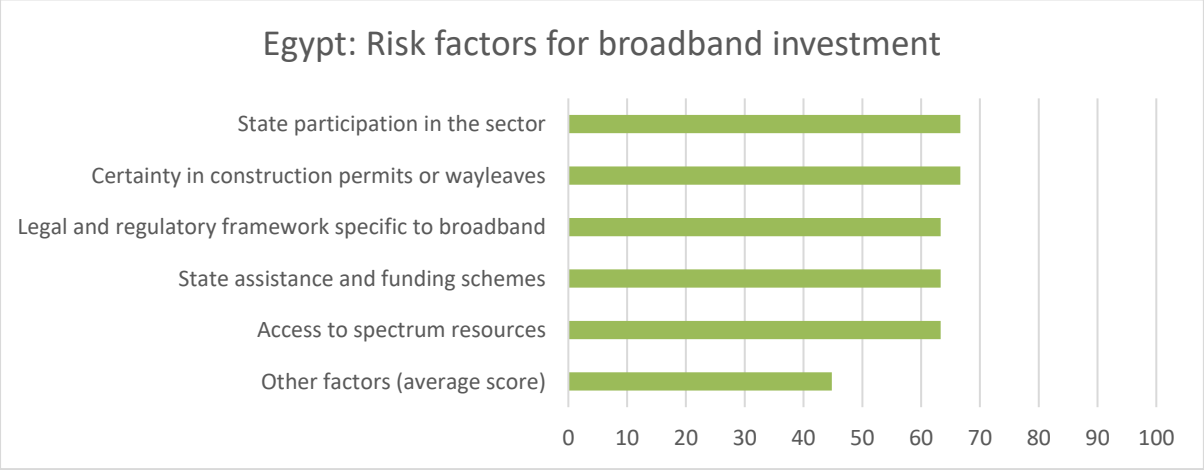
The detailed recommendations in this report are given in section 4. There are two types of recommendations, the first type to improve the overall attractiveness of markets and the second type to reduce investment risks.

For Egypt, the respondent views regarding market attractiveness are summarised below, together with the relevant recommendations for improving the overall attractiveness of the market.

Market attractiveness factors	Egypt	Recommendations for improving the overall attractiveness of the market (See section 4)
Overall size of the market, in population terms and relative spending power	👍	
Growth potential of the market, in terms of demand for broadband-services	👍	
Efficiency of the markets in terms of fair competitive conditions	👎	Recommendation 1
A clear national ICT market strategy for the country with stated ambitions and goals, for example targets for broadband coverage and take-up	👎	Recommendation 2

👍 - Good / 👎 - Medium / 👎 - Poor

The issues raised by respondents that most contribute to broadband investment risk in Egypt are shown below.



A score of zero would indicate that the factor has no influence at all on investment decisions, a maximum score of 100 would indicate that the risk associated with the factor is so high that it completely puts off any investment.

The priorities for investors are summarised below, together with references to the relevant recommendations for reducing broadband investment risks given in section 4 of this report.

Investment risk factors	Egypt	Recommendations for reducing broadband investment risks (See section 4)
State participation in the sector.	⚠	Recommendation 6
Certainty in construction permits or wayleaves.	⚠	Recommendation 8
Access to spectrum resources.	⚠	Recommendation 4
The legal and regulatory framework specific to electronic communications and broadband investments.	⚠	Recommendation 5
State assistance and funding schemes.	⚠	Recommendation 7
The country's overall legal system, predictability and process.	!	Recommendation 1
Taxation generally or targeted at the sector.	!	Recommendation 3
Trade barriers.	!	Recommendation 9
Labour relations, militancy, disruptions	!	
Quality of databases and access to information	!	
Political stability	!	
Corruption generally or applied to the sector	!	

! - Medium priority/ ⚠ - High priority

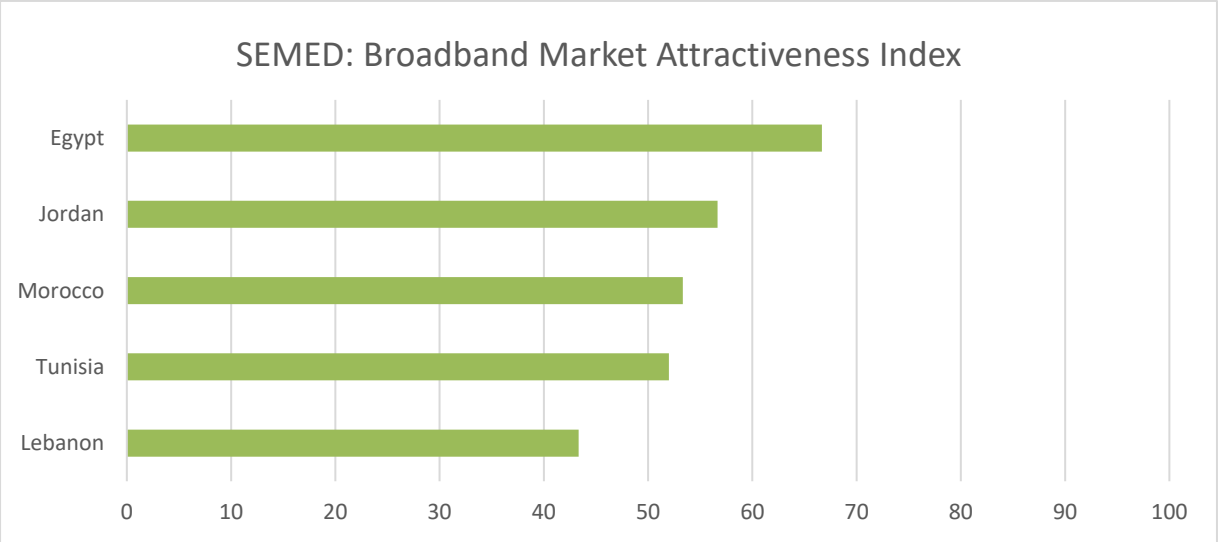
4. DETAILED RECOMMENDATIONS

The comments made by respondents regarding the attractiveness of each of the five SEMED markets surveyed, and their concerns about the investment risks involved are given in section 3 of this report. Some general recommendations are also given in section 0 "The general recommendations resulting from this survey".

This section gives a set of more detailed recommendations to improve the investment conditions in the broadband markets of the five SEMED countries. The priorities for action in each country are also given.

Recommendations on improving the overall attractiveness of the market

The market attractiveness, in terms of the pure market potential (i.e. regardless of the investment risks involved), was rated by respondents as follows:



On the comparative scale, zero would indicate a perception that the broadband market has no attraction. A score of 100 would indicate a perception that the market potential is perfect.

There are clearly differences between the five SEMED countries regarding the pure attractiveness of the market, as perceived by respondents. These differences relate to the relative uncertainties faced in the broadband market, including market competition and perceived growth potential.

From the comments received from respondents in each country, the general factors that make a market more or less attractive can be summarised as follows:

- The overall size of the market, in population terms and consumers' relative spending power.
- The growth potential of the market, in terms of demand for broadband-enabled services.
- The efficiency of the markets in terms of fair competitive conditions.
- A clear national ICT market strategy for the country with stated ambitions and goals, for example targets for broadband coverage and take-up.

The following table summarises the views of respondents for each country:

SEMED countries: Market attractiveness factors

Market attractiveness factors	Egypt	Jordan	Lebanon	Morocco	Tunisia
Overall size of the market, in population terms and relative spending power	Good	Medium	Poor	Poor	Medium
Growth potential of the market, in terms of demand for broadband-services	Good	Medium	Medium	Good	Medium
Efficiency of the markets in terms of fair competitive conditions	Poor	Good	Poor	Medium	Medium
A clear national ICT market strategy for the country with stated ambitions and goals, for example targets for broadband coverage and take-up	Poor	Good	Poor	Good	Medium

Good / Medium / Poor

In terms of market size, Egypt has the highest market potential, with a population of 100m. Morocco is the second largest with a population of 37m. Jordan's population, at 10.1m has grown significantly in the last few years, while Tunisia's population, at 11.7m has remained relatively stable. Lebanon has the smallest population at 6.9m.

All five markets are perceived as having good or medium growth potential, mainly because there is continuing growth in demand for internet-based services. In Egypt, overall mobile broadband growth is forecast to grow at the high rate of 17% per annum in the period up to 2023. In Morocco, growth is forecast at 13% per annum. The other three countries have forecast broadband growth rates of 6% per annum or less.

In all countries, broadband growth arises from a combination of new subscriber take-up, network expansion into new geographical areas, and most significantly from consumer demand for higher data speeds. Much of this new demand is still being taken up by mobile broadband offerings, although the respondents recognise that in the future, significantly more investments in fixed (mainly fibre-based) broadband infrastructure will be necessary, as business and consumer demands develop.

Although broadband growth potential is generally good, the respondents' views are tempered by the competitive uncertainties of the market and the need for more costly investments, particularly in fibre infrastructures. There are also the added risks in the mobile broadband market, especially with the lack of clear with business models for 5G and the potential for more players to enter these new markets.

Another factor – the efficiency of markets in terms of fair competitive conditions – arises from the uncertainties not only from the market size and growth factors discussed above, but also from a lack of confidence by respondents regarding the progress of the legal and regulatory regime towards best practices.

Respondents have the best level of confidence in Jordan adopting best practices in policy and regulation, with Tunisia, Lebanon and Egypt showing significantly less confidence. Respondents' views largely reflect the level of state participation in the sector and the perceived bias of policy and regulation towards the protection of the state-owned players. Greater market competitiveness naturally encourages more market efficiency and adoption of best practices.

It follows that, in order to increase the overall attractiveness of the markets for broadband infrastructure investments, a good perception of a country's policy and regulation towards more effective markets is needed. The first two recommendations below seek to increase investor confidence, even those countries that are already reasonably attractive in pure market size and growth terms. The remaining recommendations (3 to 9) seek to reduce the specific investment barriers and risks highlighted by respondents.

Recommendation 1: Demonstrating a clear commitment to the effective implementation of an investor-friendly legal and regulatory framework for the broadband market

All the countries surveyed have moved to more competitive markets, but in each, the transition to a liberalised investor-friendly legal and regulatory framework has not yet been fully achieved. In Lebanon, Morocco and Tunisia, respondents believe that the level of state ownership of network operators still has a major influence on market conditions. The nature of this distortion is examined more closely in section 2 of this report. In all five countries, the regulatory body for the sector has been established, but respondents perceive a bias in the application of the regulatory framework in favour of the incumbent operators.

For example, in Morocco and Tunisia, the published regulations promote the use of wholesale markets for local access, whereby the incumbents' copper and fibre access networks should be available to be rented by other operators to provide competitive retail offerings. Respondents claim that this market is not operating adequately, that the incumbent does not cooperate with the other operators and the regulator does not enforce the regulations.

In Lebanon, the provisions in the 2012 law to liberalise the sector have not been implemented with respect to privatisation and the establishment of a fully functioning regulator.

It is recommended that the SEMED countries continue on a path to full ICT market liberalisation, by ensuring that the sector regulatory body is fully effective with the powers to enforce the relevant competitive market safeguards.

Recommendation 2: Agreeing a clear national broadband strategy for the country with stated ambitions and goals, including targets for broadband coverage and take-up

In the opinion of respondents, policy makers need to demonstrate a strong commitment to the sector and in particular to emphasise the link between new technologies, economic growth and living standards. In order to promote the role of broadband infrastructure, clear targets should be set at national level for broadband connectivity to allow businesses and households full access to internet services of high speed and quality at affordable prices.

The recommendations from a 2014 report "Benchmarking 15 National Broadband Plans"[16], seek to give investors in broadband infrastructure the confidence that they seek. It was noted that national broadband strategies showed the following characteristics:

- National broadband plans have a local context, in terms of both the current stage of ICT development and the political aims of the plans.
- Countries in the earlier stages of ICT development have a greater focus on supply-side initiatives, building network infrastructures and encouraging widespread internet usage. Countries in later stages of ICT development focus more on demand-side measures and embedding ICT into the national society and economy.
- Supply-side targets (for example stated levels of broadband coverage and penetration) lend themselves more readily to being expressed in specific, measurable terms.
- Effective government actions often focus on the stimulation of private funding and commercial activities. However, governments always play an important role in the central coordination of initiatives, in monitoring progress, and in ensuring the plan's goals are achieved.

Recommendations on reducing the overall investment risks

In addition to the factors related to market attractiveness, the survey examined the opinions of respondents regarding investment risks – including a list of 14 potential barriers to investment. These opinions are summarised in section 3 of this report. The risks varied from country to country, as shown in the table below. Of the 14 factors, eight have medium to high risk in at least one country:

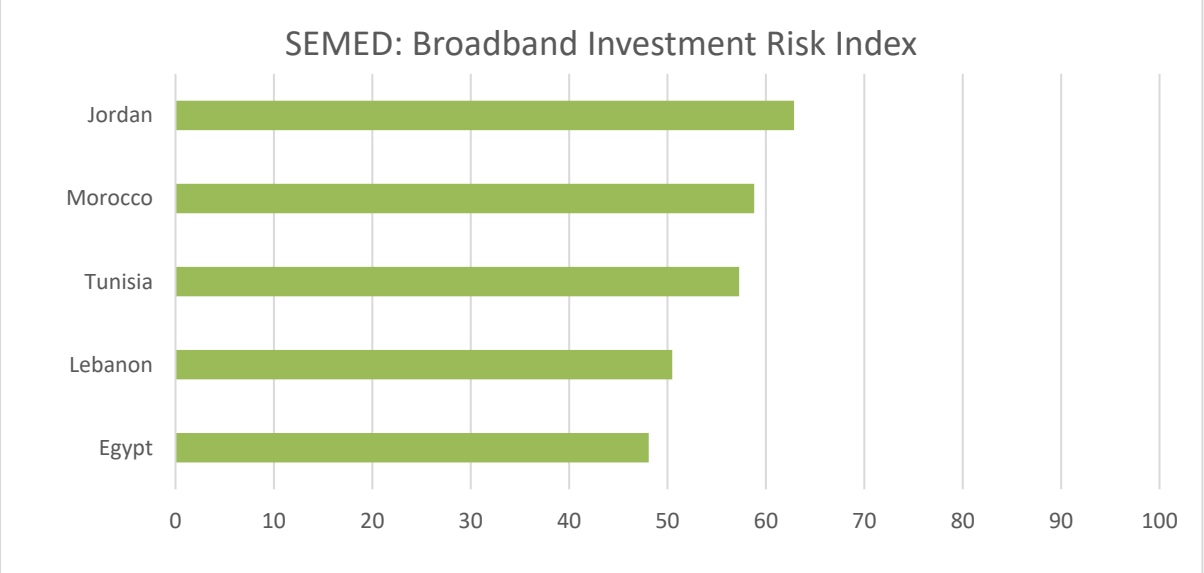
[16] https://www.cullen-international.com/studies/2014/Benchmarking-15-national-broadband-plans.html

- Taxation generally or targeted at the sector.
- Access to state-controlled resources related to investment in networks and services.
- The legal and regulatory framework specific to electronic communications and broadband investments.
- The country's overall legal system, predictability and process.
- State participation in the sector.
- State assistance and funding schemes.
- Certainty in construction permits or wayleaves.
- Trade barriers.

Of the remaining potential risks, the following list of factors had only medium to low risk in all countries:

- Availability of labour especially with digital skills.
- Quality of databases and access to information.
- Labour regulations, employment agreements, militancy, disruptions.
- Overall infrastructure.
- Political stability, security, criminality, terrorism.
- Corruption generally or in any aspect of operations.

It should be noted that the topic of the availability of labour with ICT skills, although seen as only medium to low priority at present, respondents regard the current trend, for skilled staff to leave and work abroad, as a growing problem which could become critical in the medium and longer term.



On the comparative scale, zero would indicate a perception that the broadband market has no enabling policy or has other absolute barriers and risks to investment. A score of 100 would indicate a perception that the full implementation of policies, legal and regulatory frameworks and other enabling conditions are already in place leaving no barriers or risks to investment.

SEMED countries: Priorities for action

Investment risk factors	Egypt	Jordan	Lebanon	Morocco	Tunisia
Taxation generally or targeted at the sector	!	▲	!	▲	▲
Access to spectrum resources	▲	▲	!	!	!
The legal and regulatory framework specific to electronic communications and broadband investments	▲	!	▲	!	!
The country's overall legal system, predictability and process	!	●	▲	!	!
State participation in the sector	▲	●	▲	●	!
State assistance and funding schemes	▲	●	▲	●	!
Certainty in construction permits or wayleaves	▲	●	●	▲	!
Trade barriers	!	●	●	●	▲

● - Low priority/ ! - Medium priority/ ▲ - High priority

The following recommendations aim to reduce overall investment risks for broadband markets across the SEMED countries, with the priorities for each country taken from the above table.

Recommendation 3: Aligning the taxation regime with the national objectives for ICT development

Respondents view the overall taxation levels in Jordan, Morocco and Tunisia to be a significant barrier to their investment plans. This issue is also of medium concern in Egypt and Lebanon. In Jordan and Tunisia, there are selective corporation and VAT rates for telecommunications operators and additional taxes on mobile service users.

In some cases, the revenues from sector-specific taxes are returned to the sector itself, for example the contributions paid by operators in Morocco and Tunisia into the universal service funds.

In other cases, the additional taxes paid by the sector are for funding government spending generally, for example the selective corporation taxes and VAT in Jordan and Tunisia and the "revenue sharing tax" in Jordan. In Tunisia, there are also import taxes imposed on ICT equipment, including telecommunications.

Overall taxation levels, coupled with other sector specific charges such as high spectrum fees (see below), take cash out of the sector that would otherwise have been available for further investments in infrastructure. In this respect, at macro-economic policy level, the policy aims of promoting ICT are directly contrary to the policy of taking high taxes from the broadband infrastructure sector.

In its 2013 report "Taxing Telecommunications/ICT services"[17], the International Telecommunications Union stated that:

[17] https://www.itu.int/en/ITU-D/Regulatory-Market/Documents/Publications/Taxation2%20E-BAT3.pdf

"Analytical research has demonstrated that although the telecommunication/ICT sector tax revenues play an important role in supporting national public services, this role must be weighed against the potentially adverse effects that taxation can bring to the growth of the telecommunication/ICT sector, broadband penetration, and national economic growth."

The indirect impact of telecommunications/ICT taxation: macro effects

"One of the most interesting and important aspects of the debate concerns a feedback mechanism which is widely considered to be particularly important in application to telecommunications/ICT.

"The feedback works as follows. A government levies a tax on telecommunications. As a result, the roll-out of services is delayed. This has a direct effect on national income, which includes telecommunication/ICT output. However, there is also a spill-over effect. This arises because telecommunication/ICT services are used in many other sectors and can increase productivity there.

"Accordingly, the tax has a broader effect on the growth of national income, and hence on future tax revenues from other sectors."

[Extract from "Taxing Telecommunications/ICT Services: An Overview" (ITU 2013) https://www.itu.int/en/ITU-D/Regulatory-Market/Documents/Publications/Taxation2%20E-BAT3.pdf]

Simplifying a complex set of issues, the paper concludes that "*....the choice of a level of taxes on telecommunication/ICT services is likely to depend on three factors in particular:*

1. *"Whether the apparently low cost of collection of telecommunication taxes is a strong enough consideration to justify a special tax.*
2. *"How much weight is placed on the exceptional macro-economic benefits of the spread of telecommunication/ICT services, as a ground for not taxing them.*
3. *"Whether there is any other factor which argues for the application of an especially low or an especially high tax rate on telecommunication/ICT services, as against the standard 'default rate.'"*

Respondents, particularly in Jordan, Morocco and Tunisia, placed emphasis on the second point – that more weight should be given to the macro-economic benefits of investment in broadband as an argument for reducing ICT sector-specific taxes.

The special case of import taxes in Tunisia is considered in Recommendation 9.

Recommendation 4: Ensuring that spectrum resources are used effectively

Respondents view high spectrum charges to be against the future interests of the ICT sector generally. This is especially true in Jordan, where mobile operators are currently due to pay very high sums over the lifetime of their current 3G and 4G spectrum holdings. In all the countries surveyed, the respondents' views reflect the views held in many other countries, that the investment case for 5G spectrum-based services is difficult to make, if current levels of spectrum charges are continued.

There is a widespread view that the spectrum management strategies adopted by governments and regulatory agencies should be better harmonised within the overall context of a wider ICT strategy. Specifically, spectrum management strategies should promote investments in broadband infrastructure in order to promote geographical universality, to meet the growth of existing services and to support new 5G market transformation. Some obvious steps of spectrum liberalisation are yet to be carried out in some countries – notably the move to technological neutrality, which allows operators to exploit their spectrum holdings for whatever service needs they have. In planning the release of new spectrum, governments and regulators should recognise that investors need more certainty, for example by extending licence periods and by aligning new spectrum release dates.

The charges raised for spectrum should be based on market needs as well as on the need to reflect any remaining spectrum scarcity. Open market consultations, well in advance of spectrum releases, should be

used to find the right balance in spectrum charges, recognising the cost pressures faced by operators in meeting national ICT objectives. Similarly, any quality or coverage obligations faced by spectrum holders should be subject to consultation, recognising that service quality and coverage are already subject to, and are best left to, competitive market forces. These competitive pressures are likely to increase when a wider range of 5G-based services become available, so regulatory obligations should be set only at the level required to achieve good investment conditions.

There is little doubt that 5G markets are being considered not only by the existing network operators, but also by a potentially large number of application-driven interests. Tunisia has already awarded a total of 89 "Internet-of-Things" licences, many of which will need access to spectrum resources.

In its report "5G Spectrum: GSMA Public Policy Position" (July 2019)[18], the representative body of the mobile communications sector concluded:

> *"…the success of the services is heavily reliant on national governments and regulators. Most notably, the speed, reach and quality of 5G services depends on governments and regulators supporting timely access to the right amount and type of affordable spectrum, and under the right conditions.*
>
> *"5G spectrum awards have already begun and the variation in the amount of spectrum assigned, and the prices paid, means the potential of 5G services will vary between countries. This, in turn, directly impacts the competitiveness of national digital economies."*

The potential scope of 5G

"5G is expected to support significantly faster mobile broadband speeds and lower latencies than previous generations while also enabling the full potential of the Internet of Things.

"From autonomous vehicles to smart cities and fibre-over-the-air, 5G will be at the heart of the future of communications. 5G is also essential for preserving the future of today's most popular mobile applications – like on-demand video – by ensuring that growing uptake and usage can be sustained.

"5G goes beyond meeting evolving consumer mobile demands by also delivering carefully designed capabilities that will transform industry vertical sectors. 5G introduces a new level of flexibility and agility so the network can deliver customisable services to meet the needs of a huge variety of users and connection types.

"Features like network slicing means industrial sectors can rely on the network delivering precisely what they need – ranging from speed, latency and quality of service to security."

[Extract from "5G Spectrum GSMA Public Policy Position July 2019" https://www.gsma.com/spectrum/wp-content/uploads/2019/09/5G-Spectrum-Positions.pdf]

What will 5G be used for?

The ITU has outlined specific criteria ….which will support the following use cases:

1. Enhanced mobile broadband: Including peak download speeds of at least 20Gbps and a reliable 100Mbps user experience data rate in urban areas. This will better support increased consumption of video as well as emerging services like virtual and augmented reality.

2. Ultra-reliable and low latency communications: Including 1msec latency and very high availability, reliability and security to support services such as autonomous vehicles and mobile healthcare.

[18] https://www.gsma.com/spectrum/wp-content/uploads/2019/09/5G-Spectrum-Positions.pdf

> *3. Massive machine-type communications: Including the ability to support at least one million Internet-of-Things connections per square kilometre with very long battery life and wide coverage including inside buildings.*
>
> *4. Fixed wireless access: Including the ability to offer fibre type speeds to homes and businesses in both developed and developing markets using new wider frequency bands, massive Multiple-Input-Multiple-Output and 3D beamforming technologies.*
>
> [Extract from: GSMA report: 'Fixed Wireless Access: Economic Potential and Best Practices' (2018)] https://www.gsma.com/futurenetworks/wp-content/uploads/2018/08/Fixed-Wireless-Access-economic-potential-and-best-practices.pdf

The views of investors are fully represented in the GSMA report, which recommends:

- *"Governments and regulators should avoid inflating 5G spectrum prices as this risks limiting network investment and driving up the cost of services. This includes excessive reserve prices or annual fees, limiting spectrum supply (e.g. set-asides), excessive obligations and poor auction design.*
- *"Regulators must consult 5G stakeholders to ensure spectrum awards and licensing approaches consider technical and commercial deployment plans.*
- *"Governments and regulators need to adopt national spectrum policy measures to encourage long-term heavy investments in 5G networks (e.g. long-term licences, clear renewal process, spectrum roadmap etc).*

Additionally, there is a need to ensure that new stakeholders are not excluded from applying for and receiving new spectrum releases. Greater participation, as in Tunisia, will promote innovation and ensure that all sectors of the economy can exploit new spectrum capabilities without having to rely only on the traditional holders of spectrum for telecommunications use.

Recommendation 5: Ensuring that the legal and regulatory framework fully supports broadband infrastructure investments

1) The importance of effective wholesale markets

Specific legal and regulatory conditions have been applied to the electronic communications sector in order to facilitate the significant technological and institutional changes that have taken place in the sector. These changes have resulted in more competitive markets by allowing greater consumer choice and by implementing specific competitive safeguards that apply to new entrants in order to limit the market power of a previous monopoly incumbent.

The capital-intensive nature of telecommunications infrastructure means that a new entrant cannot simply replicate the main components of a network in order to compete fully with an incumbent operator that has previously enjoyed a monopoly position. A faster transition to more competitive market conditions can be achieved by the creation of an effective wholesale market for infrastructure. Regulators have therefore sought to impose obligations on the incumbent operator that open up their network for capacity to be rented out to other operators on fair terms. This means that in going for market growth, a more recent entrant has two options to expand its reach:

- The new entrant could invest in its own infrastructure or,
- if it is not ready to invest, it could rent capacity from the incumbent. Where using the wholesale option is clearly cost-effective, retail competition can grow to meet demand quicker, because the infrastructure to provide service is already in place.

All the regulators in the countries surveyed have created regulations that oblige the incumbent operators to open up (or "unbundle") their networks. Typically, the respondents to this survey have expressed dissatisfaction that this obligation has not been properly enforced. Respondents in each country expressed the view that the incumbent fixed line operator has not made it routinely possible for the newer market entrants to use their network on the terms specified by the regulator. The result of this wholesale market

barrier is that the fixed broadband retail market remains very small in comparison to other countries. The average fixed broadband penetration in the five SEMED countries less than 8.0 per 100 population, which is less than one fifth of the average country penetration rates for fixed broadband reached in the EU.

The wholesale market barriers placed by incumbents can fall into several categories:

- Procedural barriers – the incumbent operator will typically give preference to its own needs rather than releasing capacity for the use of other operators. This often leads to long delays (respondents have claimed wholesale requests can take up to two years to fulfil).
- Lack of capacity – the incumbent operator claims that there is no capacity available for renting, for example that a duct is already full or that a cable has no spare capacity. In an effective wholesale market, the capacity planned and implemented by the supplier should take account of the additional demands of all types of retail and wholesale users, but this is rarely the case in practice.
- "Price squeezing" or "margin squeezing" – the incumbent typically calculates the wholesale charge at a rate deliberately designed to ensure that a competitor cannot succeed in the downstream retail market on price. The solution is for the regulator to use a cost modelling approach that assumes the most efficient technology use in the network and imposes a fair "cost plus rate of return" wholesale price. (In the absence of a cost model, the regulator could impose a "retail minus" charge with sufficient margin to attract users into the wholesale market.)

It is therefore recommended that the conditions for effective wholesale markets are fully implemented by the incumbents and if necessary, backed up by enforcement measures by regulators. Unless this best practice is implemented fully in the five countries, the wholesale markets will remain underdeveloped. Without this enforcement of existing regulations, fixed broadband markets will remain significantly underdeveloped.

Recent enforcement of wholesale access in Morocco

There has been a specific concern expressed by respondents in Morocco regarding the reluctance of the incumbent fixed line operator to allow competitors access to its local network. This is important in the broadband market because operators gaining access can offer a competitive fixed broadband service to customers by using the copper cables that already connect to households and businesses. Similar concerns have also been expressed by respondents in the other countries, particularly Egypt and Tunisia.

After imposing a record fine over restriction of access in the telecommunications sector, the Moroccan government has expressed the goal of seeking tighter measures against restriction of competition.

Specifically, the sector regulator imposed a record EUR309-million fine on IAM, Morocco's leading telecommunications company, for anti-competitive practices and for abusing its dominant market position by restricting access to local area loops.

[Source: HIS Markit report 17th March 2020 "Morocco to encourage more competition, challenging elite groups' dominant positions"]

2) Cost reduction measures for broadband investments

The recent technological developments in fixed and mobile communications have made possible a range of internet-based services to be delivered over high-speed broadband infrastructures. The roll-out of these new digital networks requires substantial investments. The civil engineering component of these investments, such as the digging-up of roads, the building of towers, manholes and other specialist street works, account for up to 80% of the cost of deploying high-speed networks[19].

[19] https://www.nic.org.uk/wp-content/uploads/Cost-analysis.pdf

EU rules on broadband cost-reduction

"To help achieve its "Connectivity for a Gigabit European Society"[20] targets, the European Union has sought to incentivise as much broadband infrastructure investment as possible in the EU member states. Focusing on the high civil works component of the necessary investments, the "Directive on measures to reduce the cost of deploying high-speed electronic communications networks" (2014/61/EU)[21], aims to facilitate and incentivise the deployment of high-speed electronic communications networks by reducing its cost.

"The Directive includes measures, such as the sharing and re-use of existing physical infrastructure, which can create conditions for a more cost-efficient network deployment. It will help create a digital economy that delivers sustainable economic and social benefits based on modern online services and fast internet connections.

"The measures of the Directive focus on four main areas:

- *Access to existing physical infrastructure (e.g. ducts, poles or masts) including those belonging to energy and other utilities, for operators willing to deploy high speed broadband networks.*
- *Efficient coordination of civil works.*
- *Faster, simpler and more transparent permit-granting procedures.*
- *Equipping new buildings and major renovations with high-speed physical infrastructures (e.g. mini-ducts, access point) and access to in-building infrastructure.*

"Member States had to transpose the EU Directive into national legislation and since 1 July 2016, they have applied these measures."

[Extract from "EU rules to reduce the cost of high-speed broadband deployment" https://ec.europa.eu/digital-single-market/en/cost-reduction-measures]

Respondents in all five countries surveyed expressed views that the existing conditions for all the above cost-related areas (access to ducts, poles and masts, coordination of civil works, the granting of permits and for equipping buildings for broadband) were unnecessarily slow and inefficient.

It is recommended that regulators and government bodies (both at state and municipal level) should examine the scope of the specific regulatory provisions described above for the EU. If these best-practice measures are implemented in the SEMED countries and properly enforced by the regulator, then the investment conditions for broadband infrastructures would improve significantly.

Further consideration is given in Recommendation 8 to the procedures for faster, simpler granting of permits.

3. Network sharing will be a key lever to reduce cost and make 5G deployments feasible.

Network sharing should become a standard part of the operating model for mobile operators, and the trend is accelerating as decisions on investing in 5G networks approach.

Network sharing and 5G: A turning point for lone riders

"Operators have been able to reduce the total cost of ownership by up to 30% while improving network quality through sharing a variety of both active and passive equipment. 5G will be no exception, with operators eyeing new ways of accelerating the deployment of an otherwise daunting investment.

[20] https://ec.europa.eu/digital-single-market/en/policies/improving-connectivity-and-access

[21] https://ec.europa.eu/digital-single-market/en/cost-reduction-measures

> *"The cost savings potential for network sharing is even stronger with 5G, as greenfield deployment is better suited for sharing because it avoids the cost of network consolidation. For example, the cost of small-cell deployment can be reduced by up to 50 percent if three players share the same network. But the rationale for sharing extends beyond cost, as it could solve many practical roadblocks of 5G deployment in urban areas, such as the potential for urban disruption and visual pollution from the installation of excessive equipment and fibre.*
>
> *"Given these arguments for network sharing, operators will need to have strong commercial rationale to justify stand-alone deployment of 5G, rather than sharing a common 5G network. Although such cases may exist for certain operators in particular markets, for many operators, sharing will be a necessity and requires preparation now."*
>
> [Source:https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/network-sharing-and-5g-a-turning-point-for-lone-riders]

Network sharing also is a means to accelerate 5G deployment, and to minimise disturbances from construction work and visual pollution. Given that 5G is still in its infancy in the SEMED markets, operators have the opportunity to participate in regulatory dialogue on alternative development paths and positive conditions for deployment.

There are a range of network sharing options available, which can be analysed in the context of network providers' different needs:

- Sharing infrastructure at different network levels, from microcells up to whole network Internet of Things (for example industry sector-specific) macro layers.
- Different sharing models in urban and rural markets, where cost structures and coverage areas differ.
- The number of players sharing could depend on the level of cost savings that are required to attract investment participation – in the most extreme case, a single network could be built on which all players in the market gain wholesale access.

In some countries market players have already started work on network sharing as a separate business model. Tower companies, for example, which have already proved attractive in rural areas, are predicting densification in urban areas by securing access to lampposts and rights of way for investing in fibre infrastructures.[22.]

It is recommended that network sharing should become a standard part of the operating model for broadband operators in order to improve the commercial case for many of the expected investments for the future, particularly for 5G. Regulators should engage in sector-wide consultation and if necessary prepare statutory rules for facilitating network sharing.

Recommendation 6: The role of the state

Respondents in the five SEMED countries expressed a number of opinions regarding the role of the state. These comments can be summarised into the following categories:

- The need for clear state policy for the ICT sector.
- The level of taxation, spectrum charges and other payments to the state should be consistent with the state's overall ICT policy, with regard to the need for sufficient investments by market players to achieve the policy objectives.
- A clear legal and regulatory framework needs to be in place for the sector, enforced by an independent regulator. This legal and regulatory framework should be applied fairly, without bias towards operators that are fully or partly state-owned.

[22] McKinsey & Company "Network Sharing and 5G: A turning point for lone riders" https://www.mckinsey.com/~/media/McKinsey/Industries/Technology%20Media%20and%20Telecommunications/Telecommunications/Our%20Insights/Network%20sharing%20and%205G%20A%20turning%20point%20for%20lone%20riders/Network-sharing-and-5G-A-turning-point-for-lone-riders.ashx

- Effective state-aid mechanisms need to be in place, for example universal service funding or other support measures offered by the state to private investors in order to achieve policy objectives where these objectives cannot be met by commercial investments alone. (See also Recommendation 7 below.)
- Where state investments are used to create national infrastructures, there is a clear danger that the state investments will "crowd out" further private investments. This will weaken competition and could result in an over-dependence on a single infrastructure with the resulting losses in consumer choice and quality of services.

The overall view of respondents is that when government decisions are made that significantly impact the ICT sector (especially sector policy, law and regulation, taxation and spectrum payments), these issues should be discussed with the sector participants so that they can plan their forward investments with more confidence. This is particularly true in Egypt, Lebanon, Morocco and Tunisia, where the state still retains significant ownership and control of sector participants. In most cases there is still a high level of reliance on the existing state-controlled backbone and copper access networks. In this case, any significant new state investments in new national fibre-based networks could "crowd out" further investments by private operators.

The key role of the state is to establish a clear policy for the ICT sector, within which the investment strategies of market players can have greater confidence. This recommended consultation is particularly important for the ICT sector, because any adverse impact on ICT investments also spills over onto most other sectors of the economy that rely on ICT services for their development.

It is recommended that governments should involve the private sector in consultations aimed at creating an investment environment that encourages all investments and maximises private incentives. Experience from other countries clearly shows that private participation in broadband infrastructure programmes makes any public funds used go significantly further. Private involvement also helps to create programmes that are commercially sustainable in the long term, as opposed to ones that continually rely on state aid and other subsidy programmes.

Recommendation 7: State assistance and funding schemes

Regarding the state's role in state aid or universal service mechanisms, respondents welcome such support provided that the funding is administered in a fair and transparent manner. There are various options for state support for broadband investments:

- The use of universal service funding. This mechanism is used in Morocco for the expansion of 4G mobile services into defined rural areas and in Tunisia, where the state-owned incumbent operator receives funding to assist network provision in more remote areas.
- State funding to "top up" private investments in order to ensure there is sufficient incentive for the private sector to invest. The fair and transparent method for the state to allocate this type of funding is by a competitive "subsidy auction", which ensures that the investor offering the most cost-effective solution is awarded the subsidy. This auction mechanism, widely used in the EU, has so far been used only in Morocco for the disbursement of universal service funds. The limitation of the Morocco funding was that it applied only to 4G network expansion. Ideally, the state should set the service definitions and target coverage areas and leave it to the investor to determine the most cost-effective technologies for achieving the defined service levels.
- Direct state investment in networks that connect outlying regions into a national backbone network. The concept of a state-owned national broadband network has been discussed in Jordan with little apparent enthusiasm from private investors. In Tunisia, state support is given directly to the state-owned network operator. The proposed use of this type of state sponsored network includes providing wholesale capacity to any broadband service provider. The government itself will generally also be a major user of this network for example to connect its own offices and to provide a platform for eGovernment services.
- An alternative to a fully state-funded broadband infrastructure, or "top-up" funds for private investments, is some kind of public-private partnership (PPP) venture that uses both state and private investment for the specific purpose of expanding broadband connectivity to otherwise unprofitable locations. Tunisia is using this form of partnership, which is targeted to reach a reasonable rate of return within 15 years.

The choice of state funding mechanism from the above options should be supported by relevant laws and regulations, for example a framework and supporting procedures for obtaining construction permits and rights of way.

A key aspect in the choice of any government injection of funds is the potential this creates for distorting competition in the market, including the danger of "crowding out" of private investments. The EU has addressed this issue with a specific set of rules in relation to "state aid for broadband"[23].

It is recommended that a full range of state-funding options is considered by governments in consultation with the market before decisions are reached. The different options should be tested against full cost/ benefit criteria as well as taking into account the implications of each option on the potential impact on market efficiencies, competition and consumer choice. It is also recommended that the legal and regulatory framework adopts a specific set of rules regarding state aid for broadband, following the example already implemented within the EU.

Recommendation 8: Construction permits and rights of way

For the civil works typically associated with broadband infrastructure investments (including buildings, ducts, masts, towers, poles and street cabinets), companies normally have to seek certain permissions before construction work can begin. These permissions can include access to public or private rights of way, approval of construction details and permissions to carry out civil works. Typical problems arise in:

- Negotiating wayleaves for access to land and buildings (particularly in the situation of absentee landlords or where there are multi-tenancy buildings).
- Negotiating with local authorities regarding street access and works coordination.
- Accessing existing infrastructure to reduce overall costs.

The survey respondents generally ask for faster, simpler, more transparent and fairer permit-granting procedures. This is especially true in Egypt, Morocco and Tunisia. In Egypt, the alternative operators find it very difficult to obtain permits, leaving them little choice but to use the state-owned incumbent's network to provide services. In Morocco, some localised procedures have been improved by allowing operators to apply on-line, but this is not a national scheme and the overall procedures remain inconsistent and time-consuming.

The recommended best practices, in the form of relevant powers, obligations, procedures and coordination are described below.

The UK's Digital Connectivity Portal provides practical guidance and resources about building digital infrastructure

In 2018 the UK government established, after public consultation, a "Digital Connectivity Portal https://www.gov.uk/guidance/digital-connectivity-portal *that provides resources and advice for local authorities and commercial providers to facilitate deployment of digital infrastructure (full-fibre and mobile networks).*

-Under the Electronic Communications Code (the UK regulatory framework) operators can be granted "code rights" by Ofcom, the sector regulator. This grants the operator the rights to install, operate, maintain and upgrade electronic communications infrastructure (such as fibre broadband cables) on private and public land. Ofcom publishes a register of operators with code rights.

-The code has provisions for calculating the rent to be paid to landowners for hosting equipment. Rent is now calculated based on the value of the land to the landowner rather than the value to the telecoms company.

[23] https://ec.europa.eu/regional_policy/sources/conferences/state-aid/broadband_rulesexplained.pdf

-It provides a framework for what landowners and network operators should expect from each other when negotiating wayleave agreements and suggests best practice to facilitate positive and productive engagement between all parties, including some practical examples.

-If such an agreement cannot be agreed consensually, the operator can apply to the Court to impose an agreement to confer the code rights.

[Extract from the UK government Digital Connectivity Portal

https://www.gov.uk/guidance/digital-connectivity-portal]

The coordination of civil works in the EU

The "Directive on measures to reduce the cost of deploying high-speed electronic communications networks" (2014/61/EU)[24], enables any network operator to negotiate agreements with other infrastructure providers for coordinating civil works with a view to deploying high-speed electronic communication networks. It also enables a better coordination of civil works in support of efficient infrastructure.

Additional obligations apply to network operators fully or partly financed by public means; these operators have to meet any reasonable request for coordination of works, provided that it does not entail any additional costs and does not impede control over the coordination of the works.

In order to facilitate coordination, any network operator should make available, upon specific request or via a Single Information Point, the following minimum information related to its on-going or planned civil works:

-the location and type of works

-the network elements involved

-the estimated starting date and duration of works, and

-a contact point.

[Extract from Digital Single Market policy "Coordination of Civil Works https://ec.europa.eu/digital-single-market/en/coordination-civil-works*]*

It is recommended that governments and regulatory agencies implement best practice legislation, procedures and on-line capabilities (such as those described above) that will significantly ease the problems associated with providers seeking permissions to install broadband infrastructures.

Recommendation 9: Trade barriers

The issue of trade barriers has high importance to respondents in Tunisia, where recent (2018) import tax increases have significantly raised input costs for network operators. The other countries in the survey do not report any significant problems.

A 2017 announcement of the proposed Tunisian ICT import tariffs[25] stated that:

> *"Tunisia is preparing the imposition of 20% customs duties on imported smartphones, computers and other ICT devices. The measure will take effect from 1st January 2018. This customs tax will be followed by an increase in the value added tax (VAT), from 6% to 18%.*
>
> *"For a long time, telecom products imported into Tunisia were exempt from customs duties.*
>
> *"For the Tunisian Union of Industry, Commerce and Handicrafts (UTICA), the announced tax increase will affect consumers. The Union believes that it will affect the purchase price of ICT*

[24] https://ec.europa.eu/digital-single-market/en/cost-reduction-measures

[25] http://extensia-ltd.com/tunisia-imported-telecom-products-will-subject-customs-duties-20-1-january-2018/

> *equipment. It is in addition to the many taxes already imposed on companies operating in the telecoms sector, taxes on which the Tunisian National Telecommunications Authority (INTT) is preparing a study to determine their contribution to the national economy, their impact on the purchasing power of consumers, and the obstacles they may pose to investment."*

We are not aware of the current status of the proposed INTT study on the impact of import taxes. The survey respondents are now reporting a significant impact from the 2018 introduction of import taxes on ICT equipment. It is therefore recommended that the INTT publishes a study on the impact of taxes on investments as soon as possible.

The EU has existing provisions from the 1998 EU Tunisia Association Agreement[26] about eliminating or reducing barriers on EU exports of goods to Tunisia and vice-versa.

Egypt has recently introduced the need for investors to obtain import permits for equipment which includes wireless transmitters, for security reasons.

[26] https://library.euneighbours.eu/content/eu-tunisia-association-agreement

5. Glossary of terms used in this report

3G and 4G mobile services	These 3rd and 4th generations of mobile technology currently provide the mainstream services in most countries. See also **GSM** and **5th Generation mobile.**
5th Generation mobile (5G)	5G is the latest generation mobile technology for digital wireless networks that began deployment in 2019 and is expected to become the standard for mobile broadband access plus a further range of high-speed services and applications, in particular to support the growing "**Internet of Things**".
ADSL	Asynchronous Digital Subscriber Line (ADSL) has been the most prominent existing infrastructure technology for providing fixed broadband access to end users. The achievable performance is dependent on the distance between the premises and the nearest network exchange node. Although in most cases it can provide reasonable quality and broadband capacity, it cannot reach the performance that can now be delivered over FTTH (**Fibre to the home**) technology.
ARPU	Average revenue per user – the basic measure of revenue for telecommunications operators. ARPU is calculated by dividing the total revenue from a given service by the number of subscribers to that service. It is normally quoted as a monthly figure – most operators send out monthly bills for their services.
B2B	Shorthand for "business to business." It refers to the sales companies make to other businesses rather than to individual consumers. Sales to consumers are referred to as "business-to-consumer" or B2C. In the context of this report, the B2B market consists of connecting businesses to telecommunications services including leased line networks and **VPN**s.
Bandwidth	True internet speeds are measured by a combination of bandwidth and **latency**. **Bandwidth** is the amount of data transmitted per second (bps). Typical broadband rates are measured in Megabits per second (Mbps) up to Giga bits per second (Gbps).
Broadband services	Telecommunications, media and internet services that are delivered individually or together to consumers and businesses over high-speed access links. The average speed of broadband services links has been steadily increasing and are available from around 2Mbps (2 million megabits per second) up to Gbps speeds (Gigabits per second) using different technologies.
Broadband infrastructure	Investments in broadband infrastructure take the form of networks to support fixed and mobile broadband services, together with the supporting civil engineering structures and associated equipment. National and international connectivity also includes terrestrial TV and satellite network infrastructures. Of growing importance are investments in new business models linked to connectivity. These growing investments include smart cities, vertical industry sector partnerships, logistics, content, data analytics data and the "Internet of Things".

Best Practice Index	One of the comparative indexes derived from this survey, which rates each country on a score from zero to 100 based on the respondents' confidence that the country will adopt best practices in the investment conditions for broadband within a reasonable timescale. A value of zero would indicate that the country has no best practices in the broadband sector. A score of 100 would indicate that the country has already adopted all relevant best practices.
Broadband Market Attractiveness Index:	One of the comparative indexes derived from this survey, which rates each country on a score of zero to 100 based on the respondents' perception of the pure attractiveness of a broadband market taking account of such factors as market size and growth. On the comparative scale, zero would indicate a perception that the broadband market has no attraction. A score of 100 would indicate a perception that the market potential is perfect.
Broadband Investment Index	See **Overall Broadband Investment Index**
Broadband Investment Risk Index	One of the comparative indexes derived from this survey, this rates each country on a score of zero to 100 based on the respondents' perceived barriers to investment. On the comparative scale, zero would indicate a perception that the broadband market has no enabling policy or has other absolute barriers to investment. A score of 100 would indicate a perception that the full implementation of policies, legal and regulatory frameworks and other enabling conditions are already in place leaving no barriers to investment.
Cable networks	This term generally refers to stand-alone networks (separated from traditional telecommunications networks) that were originally established within defined geographical areas to provide end users with "Cable TV" services. Using current digital technologies these networks have now been exploited to provide competitive fixed broadband access including voice, internet and media services.
Capex	Capital expenditures, most relevantly (in the context of this report) investments to install and upgrade **broadband infrastructures**.
EBITDA	A company's earnings before interest, tax, depreciation and amortisation. This is a measure of the cash surplus of a company during a defined accounting period because it is calculated by subtracting all expenses except interest, taxes, depreciation, and amortisation from net income.
eCommerce	Electronic commerce is the buying and selling of goods and services, or the transmitting of funds or, over an electronic network, primarily the internet. These business transactions occur either as business-to-business (**B2B**), business-to-consumer (B2C), consumer-to-consumer or consumer-to-business.
eGovernment	Electronic government refers to the exploitation of web-based information technologies to improve and enhance the scope, efficiency and effectiveness of service delivery in the public sector.

FDIs	Foreign direct investments.
Fibre access, Fibre to the home (FTTH)	Optical fibre cables provide an infrastructure technology for fixed broadband access to end users giving very high (Gigabits per second) broadband speeds. If the fibre connection continues all the way to users' premises it is generally referred to as FTTH or fibre-to-the-premises (FTTP). If the fibre stops at an intermediate point and continues to the user on an existing copper connection, then it is usually referred to as fibre-to-the-cabinet (FTTC) or fibre-to-the-kerb (FTTK). The generic label used for connections that include fibre is FTTx.
Grey areas	This term is used in the context of broadband network planning to refer to a geographical area of the country where only one operator plans to invest in high-speed broadband infrastructure within a timescale defined by the state policy for achieving universal broadband access. See also **White areas**.
GSM	The General System of Mobile was the previous standard (i.e. before **3G, 4G** and **5G**) used in Europe and adopted widely elsewhere for mobile voice communications and with some very limited data capability.
Internet of Things (IoT)	IoT is a concept that predicts pervasive presence in the environment of a variety of things/objects that through wireless and wired connections. Unique addressing schemes are able to interact with each other and cooperate with other things/objects to create new applications/services and reach common goals. Applications and sectors that are being developed include smart homes, smart cities, smart grids, industrial/ supply chain/ logistics, connected cars, digital healthcare, smart retail, smart agriculture and many more.
IPTV	Internet protocol television – the technical name given to TV programmes streamed over an internet (fixed or mobile broadband) connection.
ISPs	Internet Service Providers offering internet usage to fixed and mobile broadband customers.
ICT	Information and Communications Technologies (ICT) covers a range of digital technologies including telecommunications, internet and broadband. The services delivered now includes social media as well visual and print media, eCommerce and eGovernment. ICT infrastructure includes electronic communications networks providing access through higher speed fixed and mobile broadband services.
Last mile	The term normally used for the part of the network that connects customer premises with a dedicated line back to an operator's local switching node. In the past the network was based on copper pair cables (local loops), but most new investments now use fibre-based local access networks. This section of the network remains the most expensive to provide.
Latency	True internet speeds are measured by a combination of **bandwidth** and latency. Latency is the delay that is introduced by the network between the time of sending the data from one point to receiving it at the next point. Latency is usually measured in

	milliseconds (ms). It's also referred to (during speed tests) as a "ping rate".
Local Loop Unbundling	A wholesale offering by a network operator to a broadband service provider so that it can provide an end user with fixed broadband service, normally using **ADSL** technology over the existing copper access (local loop) network. Where **fibre access** has replaced copper in the network, this wholesale service is now normally called **VULA**.
MVNO	Mobile Virtual Network Operator. This is a type of mobile service provider that connects end users via a separate network operator under agreement. The MVNO company provides its own branding on the service and bills the customer. The MVNO then pays wholesale charges to the network operator.
Network slicing	One of the most innovative aspects of 5G architecture, which will let operators provide portions of their networks for specific customer uses cases — whether that use case is the smart home, the **Internet of Things** factory, the connected car, or the smart energy grid.
Margin squeeze	An uncompetitive practice used by a dominant network operator. The operator will set its wholesale charges for access to its network at a level which does not allow a competitor to offer a competitively priced service in the retail market**.**
Opex	Operational expenditures, most relevantly (in the context of this report) to run and maintain broadband networks on a year by year basis.
OTT players	Over-the-top players are service providers that offer internet-based applications over the network usually without paying full charges to the network operators. Examples are Skype (and other **VoIP** (voice-over-internet) brands, which offer very cheap phone calls over the network because the user gains access to the service via the internet.
Overall Broadband Investment Index:	The overall comparative index derived from this survey, which rates each country on a score of zero to 100 for each country surveyed. On the comparative scale, zero would indicate a perception that the investment climate is non-existent. A score of 100 would indicate a perception that the overall conditions are perfect for investment. The Broadband Investment Index is an overall index made up of three component indexes; the **Broadband Market Attractiveness Index**; the **Broadband Investment Risk Index** and the **Best Practice Index**.
PPP	Public-Private Partnerships are joint mechanisms that define financial, ownership and other responsibilities for both government and private enterprise to be involved in a combined project.
RAN sharing	Radio Access Network sharing is a way for multiple mobile network operators to share radio access network infrastructure. This leads to increased use of the same bandwidth and also improves efficiency by rendering an increased amount network coverage for the sharing operators.

Satellite networks	Satellites in stationary orbit around the earth provide mainly international telecommunications links, mass coverage of satellite TV channels and also some limited internet services to more remote regions.
SEMED	The collective name given to the Southern and Eastern Mediterranean countries that EBRD operates in.
State-aid rules/ regulations	These are a set of conditions, used by governments, that should be applied when government funds are used to invest or to subsidise (wholly or in part) business investments or operations in a country. The intended principal purpose of the rules is to ensure that state funds do not distort the functioning of an effective market, for example by crowding out (replacing) private investments or by leaving private investments at an unfair competitive advantage. The EU has already implemented a special set of state-aid rules for broadband infrastructure investments which are generally seen as a model also to be used in non-EU countries.
Terrestrial TV networks	These networks broadcast the main national and local TV and radio broadcasting channels on behalf of the media organisations that produce the programmes. In the last decade, most countries have now carried out a modernisation of their networks to complete the "digital switchover" from analogue to digital terrestrial broadcasting.
VoIP	Voice-over-Internet services which are offered by brands such as Skype. These carry voice calls "over the top" (**OTT**) of the network because the caller accesses the service via the internet and not via the network exchange. The only fee paid by the user is normally a small call termination fee which goes to the network operator at the other end of the call.
VPNs	Virtual Private Networks – a specialist service provided by telecommunications companies to large multi-site businesses. Having VPN service means that a business does not have to rent multiple separate leased lines and many of the network management functions previously done by the business customer are now provided within a VPN service by the telecommunications provider.
VULA	Virtual Unbundled Local Access is a wholesale rental service provided by a network operator to a broadband service provider in order for the service provider to serve end users with fibre-based fixed broadband. The forerunner to this wholesale service for copper networks was termed **Local Loop Unbundling**.
Wayleave	A legal right of way granted by a landowner, generally in exchange for payment and typically for purposes such as the erection of telecommunications street furniture, overhead wires or laying of ducts.
White areas	This term is used in the context of broadband network planning to refer to a geographical area of the country where no operator plans to invest in high-speed broadband infrastructure within a timescale defined by the state policy for achieving universal broadband access. See also **Grey areas**.

Wifi	Wireless networks of small reach which are normally provided in public places so that smart phone users can access internet services without using up their network data allowances.

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