Communications
Regulatory Authority
State of Qatar

هيئة تنظيم
الاتصالات
دولة قطر

# QATAR'S ICT LANDSCAPE & DIGITAL TRENDS 2022

## Supply-side Market Outlook

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**His Highness the Emir Sheikh Tamim Bin Hamad Al Thani**

**His Highness the Father Emir Sheikh Hamad Bin Khalifa Al Thani**

# Preface

## Letter from the Minister of Communications and Information Technology

This is a pivotal time in the history of Qatar: we are diversifying from a resource-reliant economy to one that embraces a full range of human industry. On the eve of hosting the largest global event – FIFA World Cup Qatar 2022 – we celebrate all the achievements we have made in preparation for it, while also setting our eyes on the broader horizon. Qatar's ICT sector is stepping boldly onto the world stage, ready and committed to establishing Qatar as a regional and global digital hub. Inspired by examples of relatively small countries taking outsized leadership roles in innovation and relevance, we are transforming ourselves into an advanced and progressive society with much to offer to our citizens, residents, and the world.

Qatar's National Vision 2030 highlights the transformative role that the information and communications technology (ICT) sector must play in realizing this bright, ambitious future. The sector will enable Qatar's growth, solidifying the foundation of a new knowledge-based economy powered by digital tools. ICT can be the power engine that brings forth new ways of living and doing business, sustainably in an environment where Qatar can further lead and grow. The demands of achieving our national vision and strategic goals requires an advanced ICT sector – one that can support innovation and digital development across all sectors while punching above its weight on the international stage.

There are exciting and remarkable opportunities to be sure, but those will come with inevitable challenges. Finding the right balance to embrace the two will unlock the huge potential of digital technologies. The Communications Regulatory Authority (CRA), Qatar's ICT regulator, has a vital role to play in creating an environment that will enable this critical sector to flourish. The CRA's primary objective is to develop a strong foundation for an innovative IT sector, one that attracts increased domestic and foreign investment and facilitates a competitive telecommunications environment to serve businesses and individuals alike. We aim to create ICT sector policies and regulations that promote both the supply and adoption of ICT and digital media, as well as enable a postal sector that can sustainably meet the needs of a changing society and diversifying economy. The CRA's Strategy 2020-2024 has been designed to support Qatar's QNV 2030 and the national development strategies by fostering the ICT sector in Qatar. The CRA's Strategy has set an ambitious target to achieve 50% growth in the IT industry by 2024, with part of this growth to be driven by multiple e-government and smart city initiatives. Qatar's government is already leading the way in digital transformation, and as we revamp the nation's digital agenda and are about to unveil an ambitious roadmap for the digital economy, expectations for the local ICT industry are also growing substantially. These mounting expectations are only natural, given the growing demand for digital innovation.

Setting foot on this ambitious journey, we are aware of the necessity to actively engage with the perspective, needs and challenges of all of our stakeholders. To help build efficient and meaningful engagement with the industry, we have kicked off the first cycle of Qatar's ICT sector survey with a focus on the supply side of the market. I am pleased to introduce, through this report, comprehensive findings and insights derived from the large-scale primary survey that fills a substantial gap of data and information for the industry. This CRA research study provides a fascinating, in-depth look at Qatar's ICT sector's current state and trends for development, and forms a baseline against which we can assess the outcome of our efforts to improve. Besides providing a comprehensive view of the ICT sector in Qatar, the research study also allowed the compilation of an activity-based list of active local ICT players and the development of the national sector-specific classification for the ICT sector; both will help track the sector's future development stages and assess its maturity. Transparency is central to building the kind of advanced, knowledge-based society that Qatar has committed to; that is why I am honored to endorse this report which highlights not only our many strengths and opportunities ahead, but also the pressing areas for improvement towards fully realizing our potential. I found the report illuminating, informative and valuable from a regulatory and market perspective, and I hope that our stakeholders, including policymakers, market participants, investors and researchers, too, will gain new insights about Qatar's burgeoning ICT market.

***HE Mohammed bin Ali Al Mannai***

*Minister of Communications*
*and Information Technology*

## Acknowledgments

We would like to extend our gratitude to all stakeholders in the sector and wider ecosystem that have collaborated with us and provided their input, thus adding value and perspective to this report. We would like to extend special gratitude to the Ministry of Commerce and Industry, the Planning and Statistics Authority, Qatar Free Zones, Qatar Financial Centre, Media City, Qatar Science and Technology Park, Qatar Development Bank and all other public and private sector entities that have actively contributed to the study, sharing data and information, their views and perceptions through the survey, expert interviews and multiple themed workshops.

# 1

# Executive Summary

This report is the outcome of extensive ICT sector research conducted in 2022 by Qatar's Communications Regulatory Authority (CRA). Inputs were collected through a standard survey to which more than 400 active ICT companies responded (with over 360 fully valid responses), further in-depth interviews with more than thirty stakeholders, and several workshops with a large circle of industry experts, market players and other representatives from the wider ecosystem. The report aims to provide a comprehensive outlook of the ICT industry in Qatar, mainly from a supply perspective, which can be leveraged by the CRA and other public entities for policymaking and to develop strategic initiatives. The report is also meant to inform industry players and thus support their business and investment decisions.

Qatar's ICT industry has been shaped and will continue to evolve within an international context of a dynamic technology and digital domain characterized by powerful trends. Digitalization continues to expand in traditional industries while new digital segments emerge and grow; advanced data analytics and artificial intelligence (AI) are gaining traction driven by data proliferation, as are cloud solutions, XaaS ("anything as a service", in reference to cloud computing and remote access), and smart environments. While the digital economy is expanding, driving investments in ICT infrastructure and solutions (e.g., 5G, high-speed fiber, data centers), the world struggles with a shortage of skilled talent. This increases competition among digital hubs and can be particularly burdensome for expat-based economies. Innovation continues to be a key priority and enabler in the industry globally, powered by centralized innovation platforms and ecosystems. Meanwhile, new governance models are required to develop fast-adapting policies that can keep up with and enable technological adoption and innovation while minimizing risks for consumers, society and the environment at large.

The report describes Qatar's ICT ecosystem and industry across six core dimensions:

## MARKET LANDSCAPE

The information and communications sector[1] currently contributes 2.7% to Qatar's non-hydrocarbon real GDP[2] . Although less than other GCC states and advanced ICT economies[3], this share has been growing in recent years: the sector's real GDP has grown at a 2.5% CAGR between 2016 and 2021 vs. 0.3% of other non-hydrocarbon sectors. This trend is likely to continue growing thanks to the government's strong commitment to catalyze the sector. For example, the CRA's 2020-2024 strategy sets a 50% growth objective for the IT segment.

Qatar's ICT industry is still mainly focused on the domestic market, with limited exports. Indeed, based on the CRA ICT Sector Survey 2022, only 11% of Qatar-headquartered businesses serve foreign markets. Despite room for improvement, as also seen by stakeholders, Qatar's ICT ecosystem already encompasses important structural elements, including state-of-the-art infrastructure, talent programs, innovation and startup accelerator initiatives, and large players and national champions across sectors (such as Al Jazeera and BeIN, Hamad International Airport, Qatar Energy, Hamad Medical Corporation, Sidra Hospital, etc.) to drive digital demand. The increasing integration of these structural elements will help drive the sector's growth and digital economy. Furthermore, ~70% of the ICT players surveyed by the CRA express a positive sentiment regarding the future of the industry in Qatar and believe the country could realize its potential to become a regional digital hub.

From a supply perspective, the telecommunications segment is mature and concentrated around a limited number of players, also due to the relatively small size of the country. Starlink Satellite Qatar, owned by SpaceX, has recently been licensed to provide satellite internet services, thus adding to existing service providers Ooredoo and Vodafone Qatar. In contrast, the IT segment is still nascent and fragmented with 80% of the companies surveyed having less than 50 employees. Provision of IT services and distribution remain the main activities of IT companies in Qatar, although about half are also involved in hardware production or software development. The majority of IT companies operating in the State include emerging technologies in their offering, however a significant ~40% share still focuses on established technologies[4] only, especially local businesses.

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[1] CRA refers to ISIC Section J as a proxy measurement for ICT sector size and contribution to the GDP based on PSA data and supported by other economic data as available; ISIC Section J includes telecommunications, computer programming and related activities, information service activities, as well as media (i.e., publishing, motion picture and sound recording, broadcasting). Most ICT activities as per the ICT sector specific classification are included in Section J, while some are excluded (mainly manufacturing and sales of hardware).

[2] Real GDP measures the value of goods and services in an economy, adjusted for inflation (i.e., GDP is given in constant prices vs. a reference year). Non-hydrocarbon GDP is approximated by GDP minus the mining and quarrying component which encompasses the extraction of hydrocarbons. For the context of this report, real non-hydrocarbon GDP is a preferred measure of the ICT sector contribution as it eliminates the fluctuations in oil and gas prices and quantity produced, thus it allows a more meaningful assessment and cross-country benchmarks, including with non-hydrocarbon driven economies. It shall be noted that the contribution of the information and communications sector to total nominal GDP was 1.8% in 2020 compared to 1.6% in 2021.

[3] E.g., the EU, US, South Korea, Singapore, Switzerland, etc. – countries ranking among top digital adopters and ICT-advanced markets across multiple rankings

[4] IT technologies that do not fall under the definition of "Emerging Technologies" – please refer to the ICT classification for further details

## MARKET LANDSCAPE

As much as Qatar has developed its ICT infrastructure to global standards and further improve it to through data centers and cloud connectivity, two major global digital players have entered the local market and will further shape up the nation's digital landscape: Microsoft has recently established its global data center node in Qatar, and Google is in the process of following suit. Furthermore, Google has just been awarded a framework agreement for Cloud Computing Services for the Qatari public sector. Such market developments are promising to deliver the ambitious cloud-first and digital growth targets of Qatar government and position Qatar as a competitive regional hub.

## INFRASTRUCTURE

Qatar boasts state-of-the-art mobile and fixed connectivity infrastructure, including near-universal 4G population coverage (~96% 5G coverage and 99% fiber coverage) and mobile speeds among the best globally. Although the cost of connectivity in Qatar is broadly in line with the rest of the GCC, it remains above OECD levels, especially for fixed broadband services. As also clear from the CRA ICT Sector Survey 2022, value-for-money of connectivity remains an area of regulatory focus in order to enhance the competitiveness of Qatar's ICT sector in the global arena.

Significant progress has been made in localizing data centers with major investments from Meeza, Ooredoo and hyperscalers. The public and private sectors are collaborating to further enhance internet connectivity, for example through increasing the traffic through the setup of Qatar's Internet Exchange Points (IXP) and initiatives to enhance international connectivity, the demand for which is expected to grow. Increasing data center capacity and ever-improving international and domestic connectivity will drive digital content localization, with leaders including Ooredoo, Vodafone, Microsoft and Google Cloud. ICT connectivity pricing, limited demand (especially from smaller businesses) and lack of skills remain some of the key challenges to achieving the full potential of the existing infrastructure and are the focus of Qatar's sector regulator and policymakers.

In terms of other infrastructure relevant to the digital economy, in particular for e-commerce, both payment and postal services have improved in Qatar in recent years. Indeed, Apple Pay and Google Pay have entered the market facilitated by recent regulatory developments and, together with local players such as C-Wallet, are driving nationwide payment gateway adoption. Postal services and package delivery services have significantly improved; further market developments are expected through the digital transformation in progress at Qatar Post, including both service portfolio and delivery, as well as operations and logistics.

## REGULATORY AND DOING BUSINESS

National emphasis on the ICT sector has resulted in the formation of new government entities, the Ministry of Communications and Information Technology (MCIT)[5] and the National Cyber Security Agency (NCSA), along with activation of a broad range of government initiatives enhancing the regulatory framework and supporting industry-wide growth prospects. A vast majority of ICT businesses surveyed consider the local regulatory setup to be attractive and acknowledge the continuous improvement made in recent years. However, sector stakeholders believe that further enhancements can be made for Qatar to become a regional leader, especially concerning data regulation and compliance. In terms of general ease of doing business, surveyed and interviewed ICT stakeholders highlight some areas for improvement, including visa regulations and processes, permits and licensing, and public procurement practices, which can be particularly burdensome for SMEs.

## INVESTMENT AND FUNDING

Around two-thirds of ICT businesses surveyed expect to increase their investments in Qatar within the next 3-5 years.  This continues a recent trend that saw, for example, Ooredoo and Vodafone Qatar investing in annual CapEx exceeding QAR 1bn since 2017, and FDI CapEx inflows to the ICT sector growing substantially. ICT companies are focusing their investments mainly on customer service and after sales support, followed by distribution networks and marketing while investments in product development and innovation are more limited.

ICT companies mainly leverage cash flow and retained earnings for funding followed, to a lesser degree, by commercial business loans or credit lines, and equity investment from private individuals. Access to funding was identified as an area for improvement in terms of requirements, cost as well as equity investment. SMEs in particular face challenges in accessing commercial loans, and the venture capital offering for startups remains underdeveloped compared to regional peers despite an encouraging growth trajectory.

## TALENT

About 1% of Qatar's total workforce is employed in information and communication[6] reflecting the still-modest size of the sector. However, future industry growth will also drive employment: more than 60% of the ICT companies surveyed have plans to hire to cover existing needs and expansion plans, and are looking for both junior profiles and experienced ones. The most requested skills are software development, cybersecurity and data analytics. Junior local talent is available and can meet part of the demand, but it will continue to be complemented by a large share of senior professionals sourced mainly from foreign labor.

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[5] Until October 2021, the ICT sector was within the domain of the Ministry of Transport and Communications

[6] Please refer to the relevant footnote above and to the appendix for further clarifications

## TALENT

Hiring Qatari nationals remains expensive for the private sector, moreover employers continue to see room for improvement in the quality of local talent. This market need is currently addressed by the emergence of capacity building and ICT upskilling programs with the participation of large industry players such as Huawei, Microsoft and Google. As for foreign talent, the global shortage is increasing competition for Qatar and exacerbating hiring challenges faced by ICT companies. Qatar could enhance its positioning by further improving quality of life and immigration requirements and processes.

## R&D AND INNOVATION (RDI)

Qatar ranks 52nd in the Global Innovation Index (GII) 2022[7], out of 132 countries. In terms of innovation outcomes, Qatar is on par with most GCC states, but still lags top ICT countries[8]. Qatar exhibits good knowledge creation outcomes; however, the ICT sector still shows limited ability to commercialize emerging knowledge. Furthermore, despite important growth in recent years, Qatar's startup activities can still grow, ultimately to match regional peers and international benchmarks.

In terms of overall quantity and quality of innovation input (e.g., institutions, infrastructures, human capital and research, market, and business sophistication), Qatar outperforms most GCC countries[9], but it can still improve to reach the regional leaders and top ICT economies. Innovation funding, availability of talent, enabling regulations & ecosystem interoperability are identified as the main opportunity areas for further enhancements to connect: for example, Qatar ranks 2nd in the GCC for R&D spending as a share of GDP, but the UAE maintains the lead. Furthermore, despite recent growth, Qatar's venture capital market remains underdeveloped compared to regional peers. Most surveyed ICT companies believe that government financial incentives and the innovation regulatory sandbox framework can be enhanced. However, although less than 40% of ICT companies engage in RDI activities today, many see market opportunities for innovative products in Qatar and plan to undertake RDI in the future.

The importance of RDI for a transition into a knowledge economy is recognized at a national level. Indeed, the nation's Research, Development, and Innovation (RDI) 2030 Strategy details a path supporting integration and development of Qatar's RDI landscape in support of national growth imperatives, and multiple RDI initiatives exist, mainly driven by public sector entities.

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[7] Index developed by the World Intellectual Property Organization (WIPO) that ranks countries according to both innovation input (institutions, human capital and research, infrastructure, market sophistication, business sophistication) and output (knowledge and technology outcomes; creative outputs), https://www.wipo.int/global_innovation_index/en/

[8] E.g., the EU, US, Switzerland, South Korea, Singapore and other countries – countries ranking among top digital adopters and ICT-advanced markets across multiple rankings

[9] Based on the Global Innovation Index (GII) 2022

# 2

# ICT Classification, Research Scope & Methodology

# ICT Sector Classification

Within the context of the CRA ICT Sector Survey 2022, which serves as an input to this report, the CRA has developed a comprehensive classification of the ICT sector (Figure 1). The classification seeks to:

- Establish national ICT sector taxonomy principles and categories to help better understand the sector's business maturity in Qatar;
- Establish a framework that supports further development of relevant sector-specific and national policies;
- Provide guidance for companies on mapping their products and services against an established classification specific to Qatar's ICT sector, including where on the value chain their business stands;
- Enable all stakeholders to have better awareness of the overall sector and conduct outcome-driven analyses.

**Figure 1. ICT Sector Classification Structure**

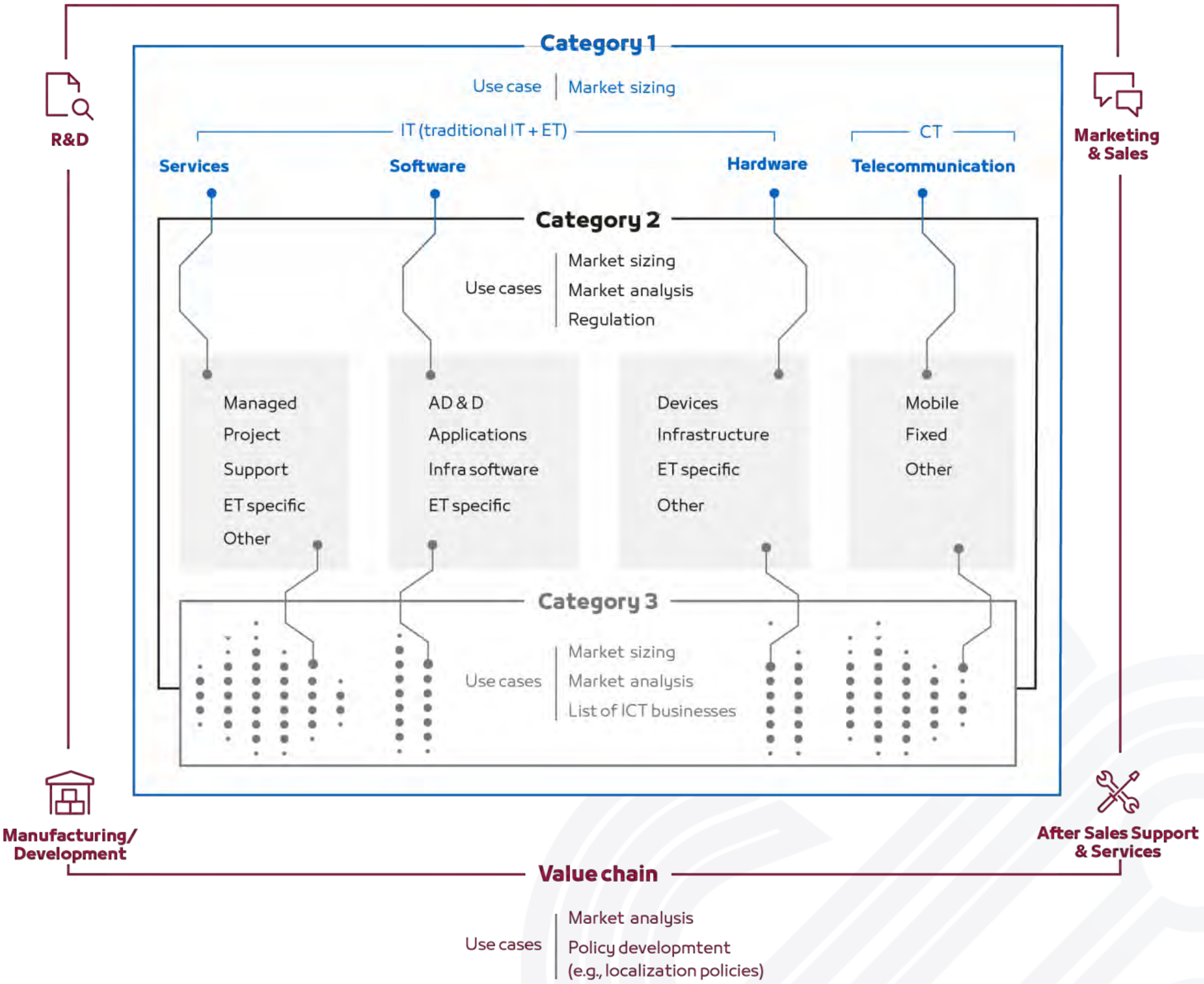

Category 1
Use case | Market sizing
IT (traditional IT + ET)
CT
Services
Software
Hardware
Telecommunication
Category 2
Use cases
Market sizing
Market analysis
Regulation
Managed
Project
Support
ET specific
Other
AD & D
Applications
Infra software
ET specific
Devices
Infrastructure
ET specific
Other
Mobile
Fixed
Other
Category 3
Use cases
Market sizing
Market analysis
List of ICT businesses
R&D
Marketing & Sales
Manufacturing/ Development
After Sales Support & Services
Value chain
Use cases
Market analysis
Policy developmtent
(e.g., localization policies)

Figure 2. Definitions of Information Technology and Communications Technology

**Information Technology**

**Traditional Information Technology**

The use of any computers, storage, networking and other physical devices, infrastructure, and processes to create, process, store, secure and exchange all forms of electronic data.

**Emerging Technologies**

Innovative technologies that have been recently developed, are under development, or will be developed within the next few years, and that are creating, or are expected to create, significant social or economic effects.

**Communications Technology**

**Telecommunications**

The provision of telecommunications networks and services related to access to voice, internet, and data through and inclusive of all telecommunications standards (fixed, mobile, satellite, etc.).

"Communication technology" and "telecommunications" are used interchangeably in this document.

Cybersecurity

Edge computing/ Cloud computing

Internet of Things (IoT)

Extended Reality

Learning

AI/Machine

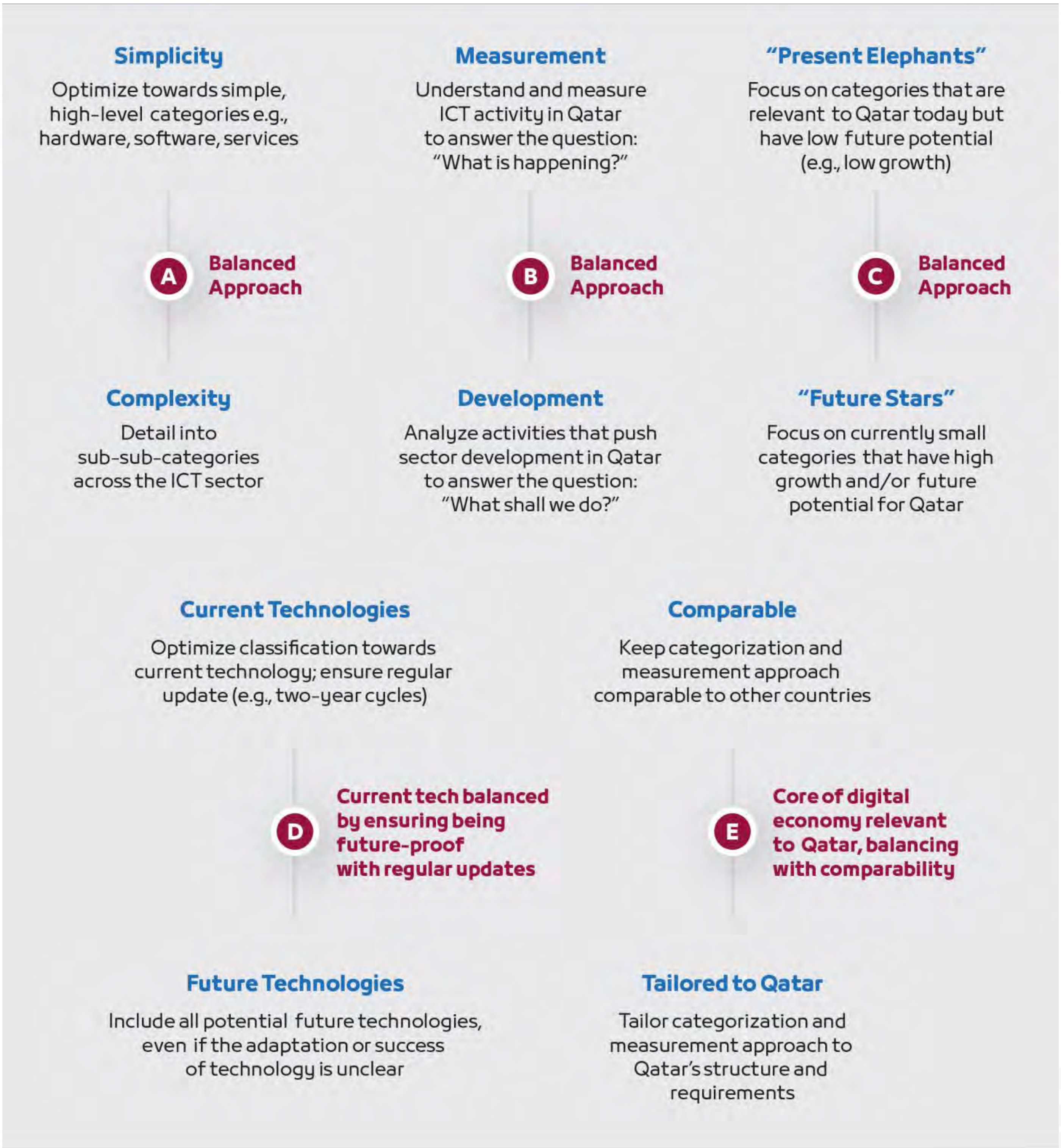
Blockchain/ Distributed Ledger

The classification has three levels of granularity: Category 1, Category 2 and Category 3. Adjacent to these three categories, a horizontal layer of value chain activities (R&D, Manufacturing, etc.) is added to map the business profiles of local market players across all categories.

Category 1 domains include Information Technology (IT) and Communications Technology (CT) (Figure 2).

The classification is designed to be inclusive and activity-based. Companies can be (and as the survey has found out, typically are) active across several aspects of the classification, multiple categories and subcategories, as well as value chain steps. Underlying technologies might change, but the activities will remain. The classification was developed based on the CRA strategy and mandate, best-practice benchmarks, and input from global experts and local ICT companies and stakeholders. Furthermore, the taxonomy was designed to balance considerations across several dimensions (Figure 3).

Figure 3. Multidimensional Balanced Approaches to ICT Sector Classification



**Simplicity**

Optimize towards simple, high-level categories e.g., hardware, software, services

**A** **Balanced Approach**

**Complexity**

Detail into sub-sub-categories across the ICT sector

**Measurement**

Understand and measure ICT activity in Qatar to answer the question: "What is happening?"

**B** **Balanced Approach**

**Development**

Analyze activities that push sector development in Qatar to answer the question: "What shall we do?"

**"Present Elephants"**

Focus on categories that are relevant to Qatar today but have low future potential (e.g., low growth)

**C** **Balanced Approach**

**"Future Stars"**

Focus on currently small categories that have high growth and/or future potential for Qatar

**Current Technologies**

Optimize classification towards current technology; ensure regular update (e.g., two-year cycles)

**D** **Current tech balanced by ensuring being future-proof with regular updates**

**Future Technologies**

Include all potential future technologies, even if the adaptation or success of technology is unclear

**Comparable**

Keep categorization and measurement approach comparable to other countries

**E** **Core of digital economy relevant to Qatar, balancing with comparability**

**Tailored to Qatar**

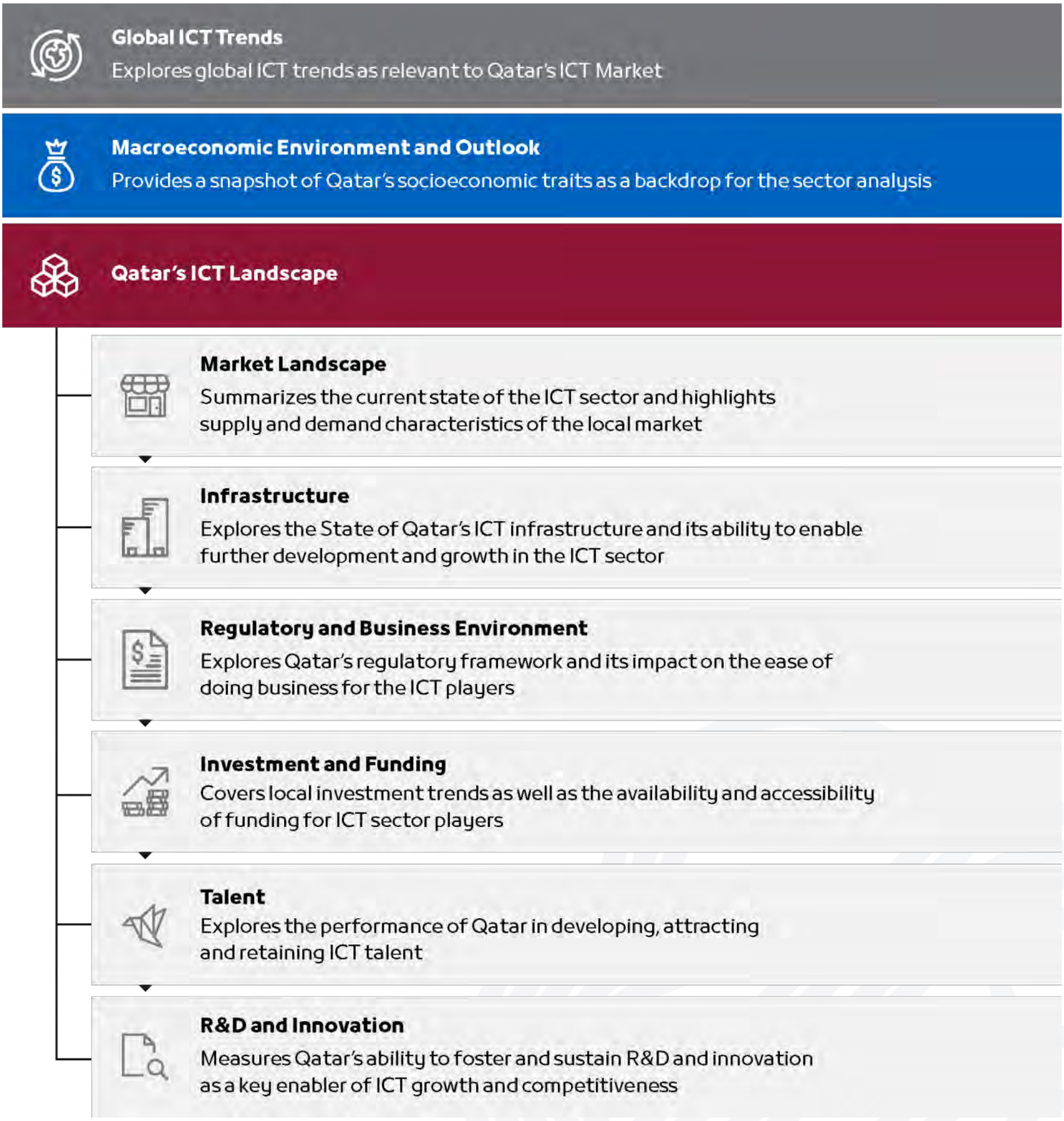
Tailor categorization and measurement approach to Qatar's structure and requirements

As an immediate tangible output, the ICT sector classification allows the CRA as a sector regulator to start building a database of existing ICT businesses in Qatar and their key activities along with other features. This provides the foundation for multiple use cases, including market sizing and analysis, as well as assessment of key challenges, needs and policy interventions as necessary by segment (Figure 2). Further on, the CRA also aims to develop, maintain and publish an up-to-date list of active ICT businesses in Qatar.

# Scope of the Report

This report seeks to provide a holistic, supply-side outlook of Qatar's ICT sector. The insights are distilled based on extensive research of the local sector and global industry trends, and are structured to provide an overview of international ICT trends, a snapshot of Qatar's macroeconomic environment and deep dives into six dimensions of the country's ICT landscape (see Figure 4).

**Figure 4. Structure of the Report**



**Global ICT Trends**
Explores global ICT trends as relevant to Qatar's ICT Market

**Macroeconomic Environment and Outlook**
Provides a snapshot of Qatar's socioeconomic traits as a backdrop for the sector analysis

**Qatar's ICT Landscape**

**Market Landscape**
Summarizes the current state of the ICT sector and highlights supply and demand characteristics of the local market

**Infrastructure**
Explores the State of Qatar's ICT infrastructure and its ability to enable further development and growth in the ICT sector

**Regulatory and Business Environment**
Explores Qatar's regulatory framework and its impact on the ease of doing business for the ICT players

**Investment and Funding**
Covers local investment trends as well as the availability and accessibility of funding for ICT sector players

**Talent**
Explores the performance of Qatar in developing, attracting and retaining ICT talent

**R&D and Innovation**
Measures Qatar's ability to foster and sustain R&D and innovation as a key enabler of ICT growth and competitiveness

# Methodology and Data Sources

This report has been developed based on the findings from a comprehensive CRA ICT Sector Survey that ran between January and September 2022. The report leverages a variety of primary and secondary sources to ensure various data points, quantitative and qualitative, that provide a range of different perspectives to contribute to the comprehensive assessment of Qatar's ICT sector. Sources include a survey of ICT businesses, stakeholder interviews with industry leaders, sector experts and other stakeholders, workshops and roundtable discussions, and external secondary research. A brief description of these data sources is provided below, while a more comprehensive explanation of the methodology used is provided in the appendix.

The large-scale primary research which the CRA has conducted incorporates findings from hundreds of stakeholders spanning several categories which compose the ICT sector's supply side: ICT market players and investors, regulatory bodies, ministries, licensing platforms, other government entities, talent providers, financiers, innovation supporters, research organizations and academia (Figure 5).

### Standard survey for ICT businesses

The primary quantitative survey engaged 1300+ ICT companies and polled their business profiles, operational backgrounds, perceptions and other information across the key themes covered in this report. This survey returned over 400 responses (of which over 360 were fully valid) from ICT companies across different segments (e.g., IT and telecommunications), sizes and geography types (e.g., those headquartered in Qatar and internationally), and therefore forms a representative quantitative basis for the insights derived in this report.

### Stakeholder interviews

In addition to the survey, as part of the qualitative research component, the CRA has conducted over 40 in-depth interviews with key stakeholders including industry leaders, entrepreneurs, research and innovation players, and government entities. The interviews have complemented the survey results with qualitative context and first-hand expert insights into market developments.

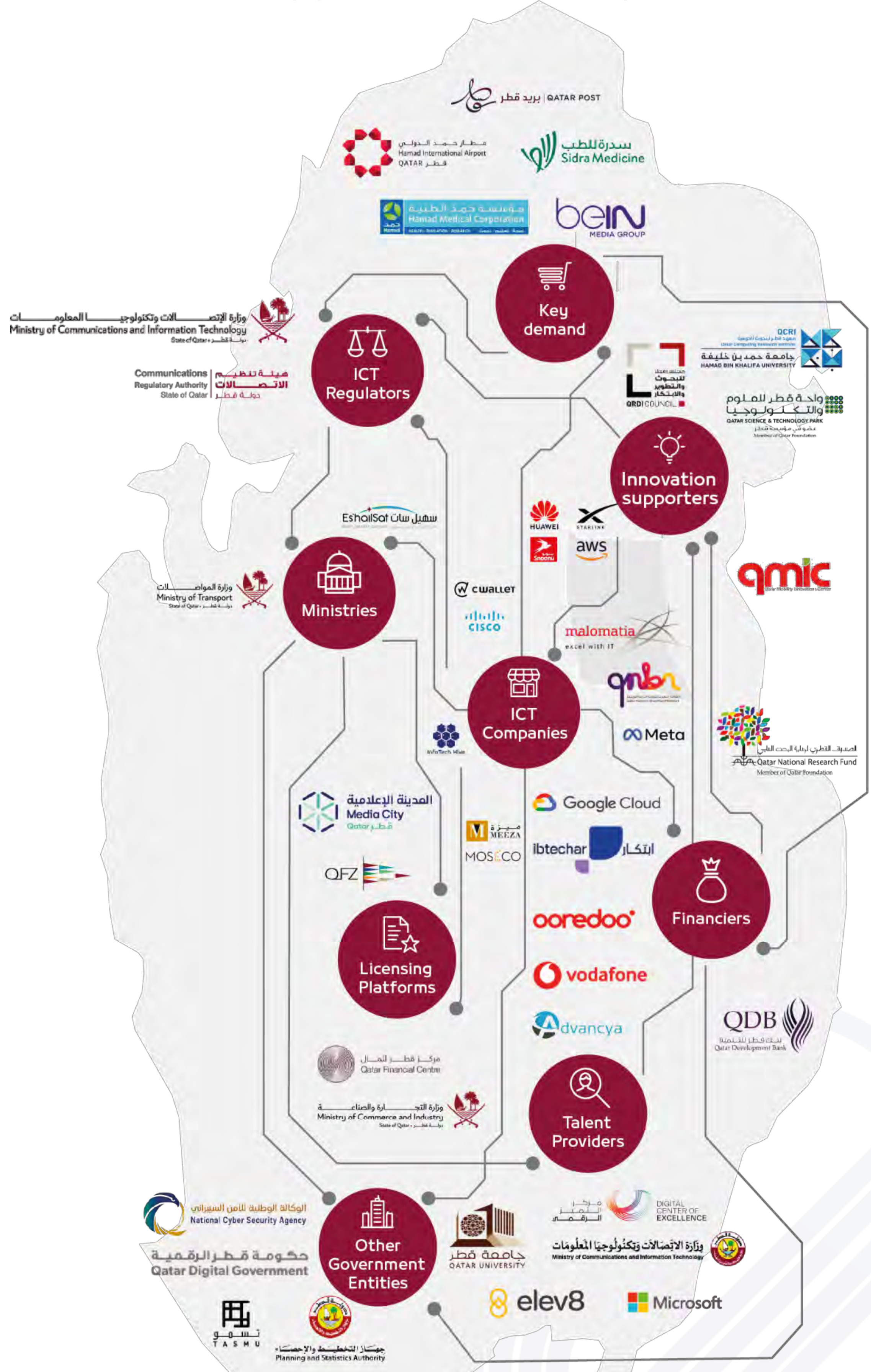
### ICT workshops and roundtable discussions

Over the past year, the CRA has held a series of targeted workshops and group discussions with industry leaders and various stakeholders from the ecosystem focusing on key research themes and market aspects. The workshops aimed at gaining understanding of the existing challenges and opportunities in the sector and discussed potential approaches that could address highlighted pain points and drive growth.

### Secondary research

Extensive secondary research was conducted to connect the local ICT market findings to wider perspectives. It focused on international and regional trends, the role of ICT in the national economy, and further local market perspectives. This additional data and information allowed for a comparative analysis through key performance indicators and benchmarks which leverage historical data from Qatar and selected peers. Sources of secondary data include academic institutions, government organizations, international non-profits, research institutions, and private sector companies among others.

## Figure 5. Select Stakeholders Engaged for the CRA Research Study 2022


Qatar Post
Hamad International Airport
Sidra Medicine
Hamad Medical Corporation
beIN Media Group
Key demand
ICT Regulators
Ministry of Communications and Information Technology
Communications Regulatory Authority State of Qatar
QCRI
Hamad Bin Khalifa University
QRDI Council
Qatar Science & Technology Park
Innovation supporters
Huawei
Starlink
Snoonu
aws
EshailSat
Ministries
Ministry of Transport
cwallet
cisco
qmic
malomatia
qnbn
ICT Companies
Meta
Qatar National Research Fund
InfoTech Hive
Media City Qatar
Google Cloud
Meeza
MOSECO
ibtechar
QFZ
ooredoo
Financiers
Licensing Platforms
vodafone
Advancya
QDB Qatar Development Bank
Qatar Financial Centre
Ministry of Commerce and Industry
Talent Providers
National Cyber Security Agency
Qatar Digital Government
Other Government Entities
Qatar University
Digital Center of Excellence
Ministry of Communications and Information Technology
TASMU
Planning and Statistics Authority
elev8
Microsoft

Not exhaustive

Source: CRA

Figure 6. CRA-Led Stakeholder Forums in 2022

23 March

**IT Roundtable**

Communications Regulatory Authority State of Qatar
هيئة تنظيم الاتصالات دولة قطر
ممكني تطوير قطاع الاتصالات وتكنولوجيا المعلومات في دولة قطر

26 April

**Workshop #1**
**ICT - Related R&D**

Communications Regulatory Authority State of Qatar
الطاولة المستديرة لقطاع تكنولوجيا المعلومات في دولة قطر
QATAR IT ROUNDTABLE

**4 Multi-Stakeholder Forums**

QATAR IT ROUNDTABLE

22 May

**Workshop #2**
**Enablers of Qatar's ICT Sector**

16 June

**Workshop #3**
**Localization of Qatar's ICT value chain**

Source: CRA

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1 10 1001 0101
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# 3

# Global ICT Trends

# KEY FINDINGS

**01**

Digitalization continues to expand across traditional industries, coupled with the growth of born-digital segments, in response to demand from consumers

**02**

Data proliferation is driving the growing significance of advanced analytics and AI as key enablers of digital transformation and the knowledge economy

**03**

Smart environments such as smart homes and smart cities continue to gain traction with developments in and adoption of emerging technology

**04**

The ICT market structure is changing through M&A and delivery models are shifting, driving demand for cloud solutions and XaaS

**05**

Competition for skilled tech workers is high globally as demand far outweighs supply

**06**

Infrastructure, particularly that required for 5G and data centers, is more important than ever as an enabler of the ICT market

**07**

New governance models are required to create fast-adapting policies that keep up with and enable technological innovation while mitigating risks

**08**

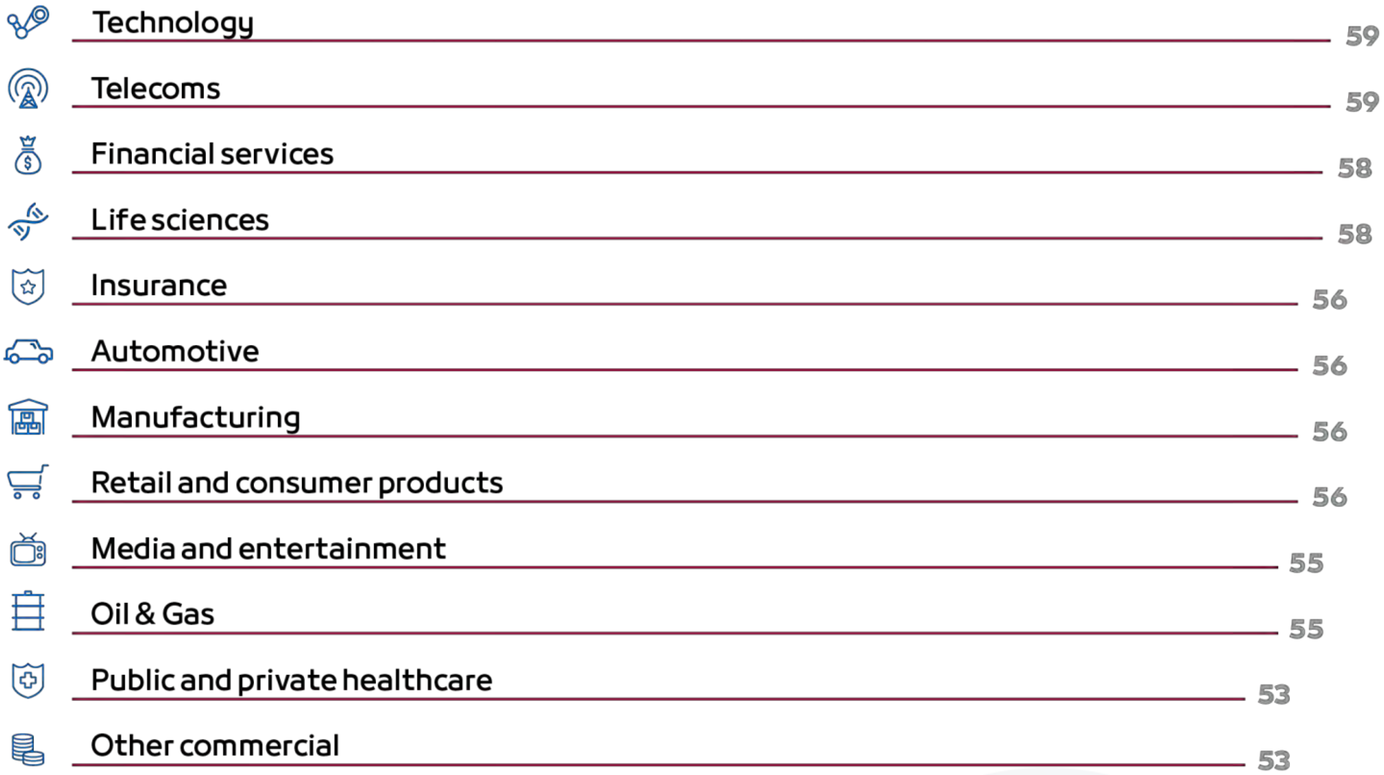
Centralized innovation platforms and ecosystems are growing in popularity as stakeholders attempt to accelerate the pace of innovation

# Overview

Trends influencing the economy and the ICT sector globally have a strong impact on Qatar's local context, and policymakers and other stakeholders should take these factors into account at the outset when defining forward-looking strategies. To put Qatar's market development into proper perspective, our expert research has identified key trends that have great importance both on a global scale and for Qatar.

## 1 – Digitalization continues to expand across traditional industries, coupled with the growth of born-digital segments, in response to demand from consumers

Figure 7. Digital Maturity by Industry 2020 (index value by industry)



Source: Dell Digital Transformation Index 2020

Digital transformation of traditional industries and the proliferation of born-digital business models provide strong growth foundations for the ICT sector. Dell Technologies' *Digital Transformation Index 2020*[10] shows that many industries have already digitalized to some extent, although the level of maturity varies between industries (Figure 7). Globally, technology, telecom and financial services are the most digitalized industries while media & entertainment, oil & gas (O&G) and health are the least digitalized. Despite different levels of digitalization achieved, there is still a strong motive for each sector to continue investing in this transformation: for example, the World Economic Forum estimates that the digital transformation of the O&G industry could improve the sector's environmental impact while creating USD 1T for firms and USD 650bn for customers and society in general[11].

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[10] A measure of digital transformation progress around the world, developed every two years by Dell Technologies, latest report edition available is as of year 2020, https://www.dell.com/en-us/dt/perspectives/digital-transformation-index.htm#scroll=off

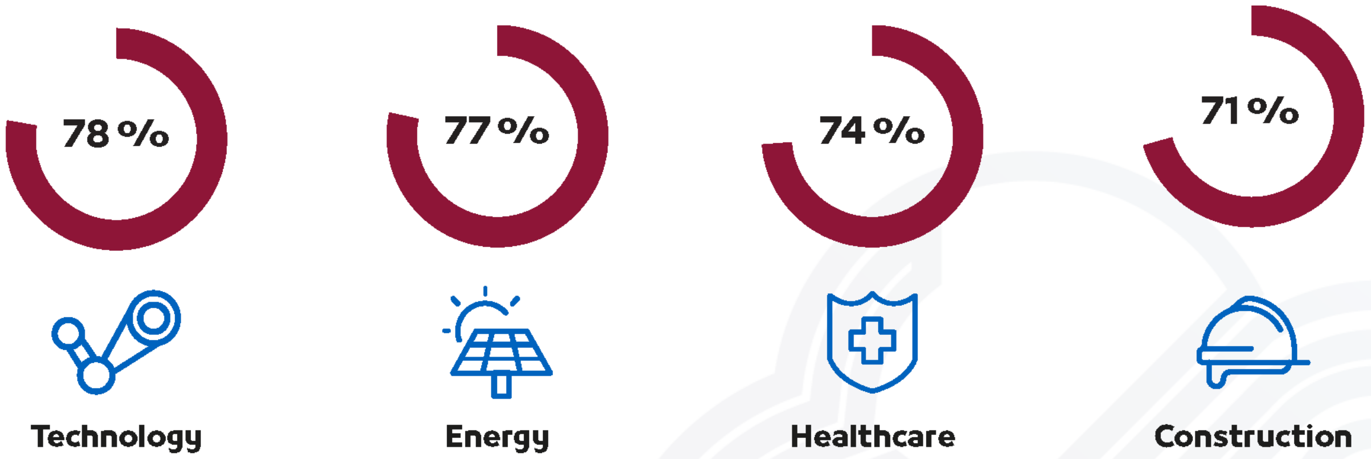
The COVID-19 pandemic has further significantly impacted digitalization efforts across the globe, forcing many organizations to transform more quickly than expected. In fact, a survey conducted by the American company Twilio of over 2,500 enterprise decision makers globally found that 97% viewed COVID-19 as an accelerator of their company's digital transformation (Figure 8). On average, the pandemic was perceived to have advanced their company's digital strategy by seven years[12].

In addition to the digitalization of traditional industries, there are born-digital segments that are emerging and/or continuing to expand. This can be observed through increasing demand for digital products and services from consumers in B2B and B2C segments (e.g., e-commerce, e-government, app economy) and through the emergence of entirely new virtual platforms (e.g., the metaverse, online gaming and e-sports, remote work) which expand ICT growth horizons. e-Commerce, though already prominent across sectors, is still growing rapidly and facing significant developments (Figure 9). The meta-verse is a much newer development which is expected to experience a 40% CAGR until 2030, when it could reach almost USD 700bn in global market size. Metaverse use cases are extensive, and they will likely drive growth across the Telecommunications, Media, and Technology (TMT) industry while disrupting many B2B and B2C companies as they continue their digital transformation (Figure 10).

**Figure 8. Acceleration of Digital Transformation due to COVID-19 by Sector**

**Question:** Has the COVID-19 pandemic sped up digital transformation in your organization?

**Answer:** Yes, a great deal



Source: Twilio COVID-19 Digital Engagement Report, 2020

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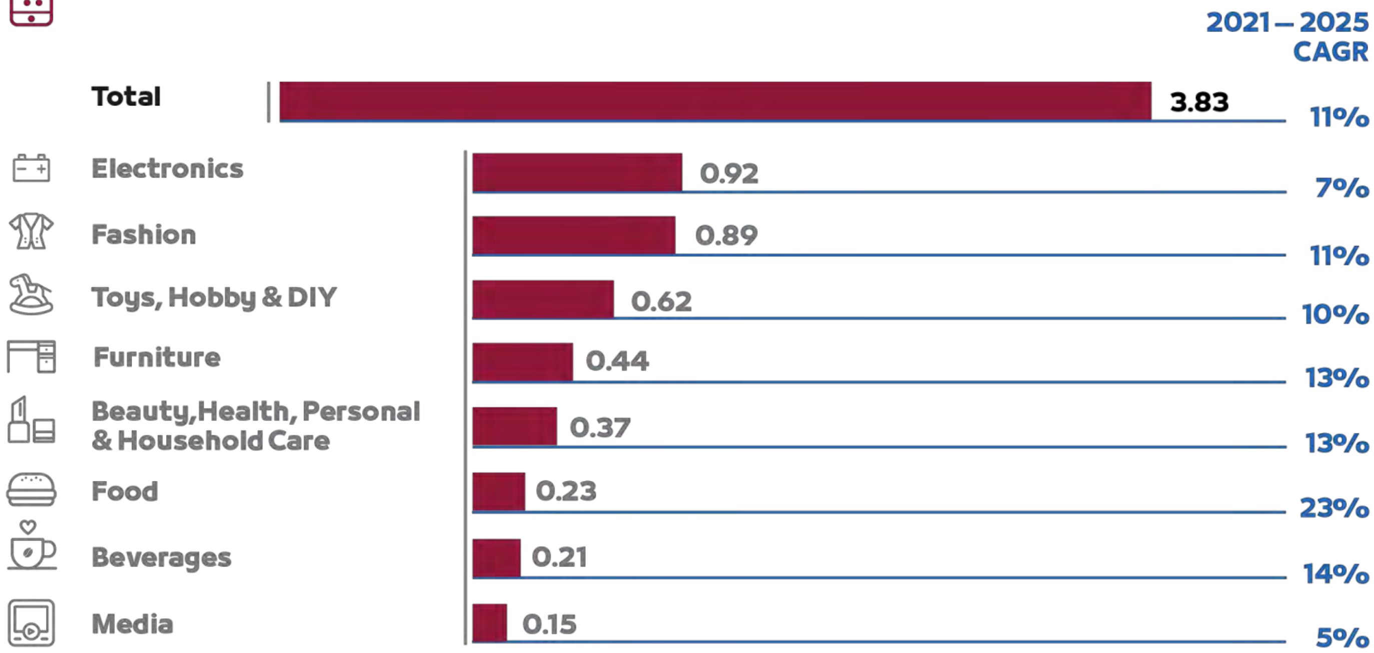
[11] World Economic Forum, Digital Transformation of Industries: Oil and Gas Industry, https://www.weforum.org/reports/digital-transformation-of-industries/

[12] Twilio, COVID-19 Digital Engagement Report, https://pages.twilio.com/rs/294-TKB-300/images/UPDATE_Aug_Twilio_COVID-19_Digital_Engagement_Report.pdf

Figure 9. Global E-Commerce Snapshot

## 2021 Global E-Commerce Market



## User Penetration

| 2022 | 2025 |
|---|---|
| 54.1% | 62.5% |

## Top 5 E-Commerce Companies by 2020 Revenue

| USD bn | amazon | JD.COM | Alibaba.com | 唯品会 vip.com | wayfair |
|---|---|---|---|---|---|
| | 386.1 | 108.1 | 104.0 | 14.8 | 14.1 |

## E-Commerce Adoption

### Global E-Commerce Developments

| | |
|---|---|
| **Social Commerce** | Social media platforms like Facebook Marketplace and Instagram Shopping are emerging as prominent e-commerce channels.<br>Social commerce is expected to grow from **USD 992bn in 2022** to **USD 2.2Tn in 2025.** |
| **Digital Payments** | **35% of consumers** prefer using digital wallets like Apple Pay and Google Pay when shopping online.<br>Digital wallets were used more than debit cards, bank transfers, and buy now-pay later options combined in 2020. |
| **Augmented Reality Commerce** | AR enables digital customers to interact with products as they would when shopping in-person.<br>**Over 100 million consumers** are estimated to have been shopping with AR in 2021. |

Sources: Statista; GlobalData, CRA[13],[14]

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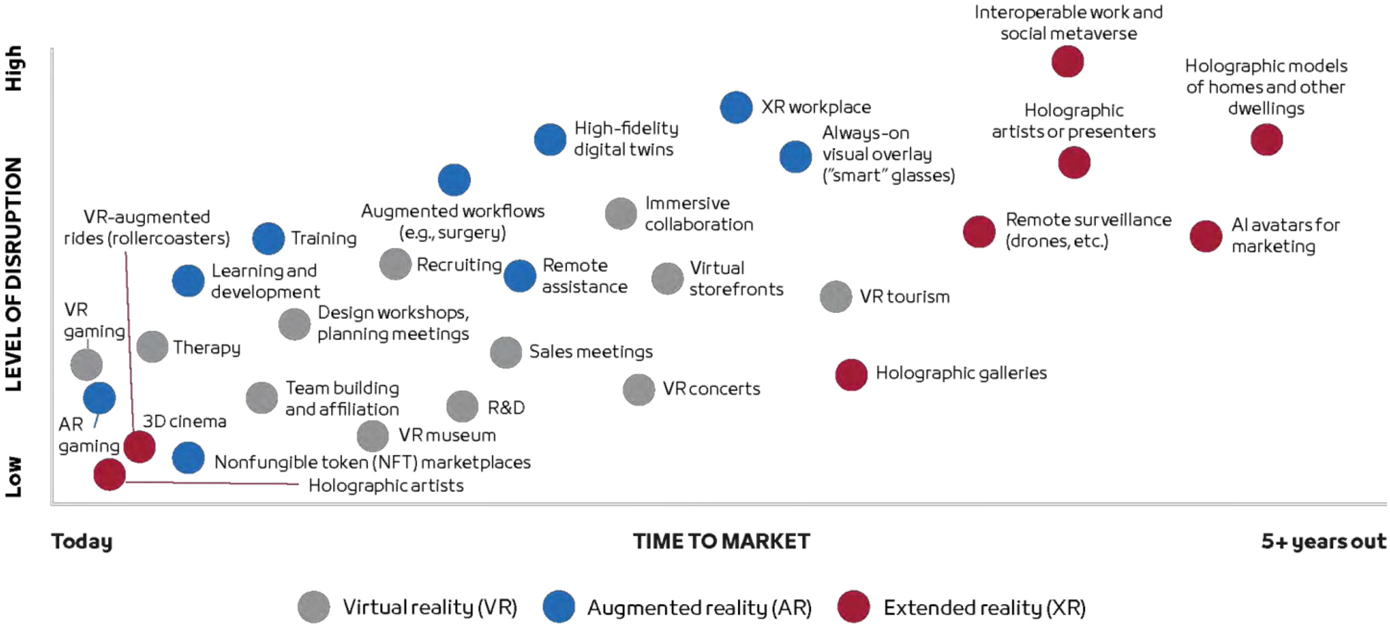
[13] GlobalData, Top 10 ecommerce companies by revenue benefited from pandemic-driven changes in consumer behavior in 2020, https://www.globaldata.com/media/business-fundamentals/top-10-ecommerce-companies-revenue-benefited-pandemic-driven-changes-consumer-behavior-2020-says-globaldata/

[14] Statista, Digital Markets: E-Commerce Worldwide, https://www.statista.com/outlook/dmo/ecommerce/worldwide

Figure 10. Expected Disruption of Metaverse Use Cases



Source: Pandemic innovation propelled performance (BCG)

## Relevance to Qatar

The global digitalization trend is reflected prominently in Qatar. Indeed, evidence from the CRA ICT Sector Survey 2022 suggests that the degree of digitalization in the country is continuously increasing thanks to improvements in infrastructure, increasing investment by the private sector and ambitious government-driven initiatives (detailed in the following pages). Despite this growth, further progress is required to position Qatar as a global digital leader. Closing the gap will drive further digitalization of traditional industries while also supporting newer, born-digital segments.

One sector which will continue to see substantial digitalization is public administration. Despite considerable digitalization efforts undertaken in the past years under the Qatar Digital Government initiative, room for improvement remains: for instance, a 2022 United Nations study ranks Qatar's e-government development status 78th globally (down from 66th place in 2020) and 6th in the GCC, which hints at additional investments being required[15]. Current initiatives such as the Cloud First policy are expected to create a major shift towards digital and cloud adoption for all government. Despite the decline in Qatar's overall global e-government ranking, user satisfaction with government e-services has grown from 58% in 2020 to 86% in 2022, the highest rating in over 40 surveyed countries. In fact, 81% of respondents believe government digital services are better than those of the private sector, indicating that the public sector could take a leadership position and become a role model in digitalization[16].

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[15] United Nations Department of Economic and Social Affairs, E-Government Survey 2022 – The Future of Digital Government, https://desapublications.un.org/sites/default/files/publications/2022-09/Web%20version%20E-Government%202022.pdf

[16] Boston Consulting Group, 2022 BCG Digital Government Citizen Survey

Besides public administration, other industries in Qatar will continue their digital transformation to sustain or enhance their competitiveness. Some government initiatives are enabling these future transformations, with programs like TASMU which engages stakeholders across all sectors to accelerate digital transformation in support of Qatar's development as a smart nation[17].

E-commerce is also expanding in Qatar as industries continue to digitalize, additional payment gateways become available and consumers demand a more digitized purchasing experience. In 2021, Qatar had the highest average revenue per e-commerce user within the GCC at USD 1,700, and this figure is expected to reach USD 2,580 by 2025[18]. The Qatari e-commerce market size is expected to almost double in this timespan and could reach USD 6.2bn by 2025. Propelled by supply and demand-side pressures to digitalize, this growing market will provide many opportunities for the ICT sector. The segment already includes local startups and companies offering products and services that enable e-commerce; examples include e-invoicing platform Fatoora, mobile wallet SkipCash, and online payments enablers Dibsy and cWallet. Recognizing the importance of e-commerce for the digital economy, the Ministry of Communications and Information Technology has launched initiatives to increase consumers' trust among local e-commerce providers.

## 2 – Data proliferation is driving the growing significance of advanced analytics and AI as key enablers of digital transformation and the knowledge economy

As the number of connected devices increases (based on Machine-to-Machine (M2M) and Internet of Things (IoT) use cases in particular), internet penetration and connectivity become increasingly universal and economic and societal dependence on information transfer increases, the volume, velocity and variety of data grows dramatically. The IDC Global DataSphere, a measure of the total amount of data that is created yearly, forecasts that worldwide data creation will more than double in the next four years, driven mainly by unstructured data (Figure 11)[19].

Although less than 1% of unstructured data and less than half of structured data is presently analyzed[20], it is clear that the effective use of data can provide a host of benefits to businesses and entities across sectors, including increased productivity, product and business model innovation, organization and process efficiency, and enhanced decision-making. In the future, generating value from data at different stages of the value chain will be at the center of the knowledge economy and of the digital transformation of more traditional industries[21].

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[17] Further details about TASMU are provided later in the report

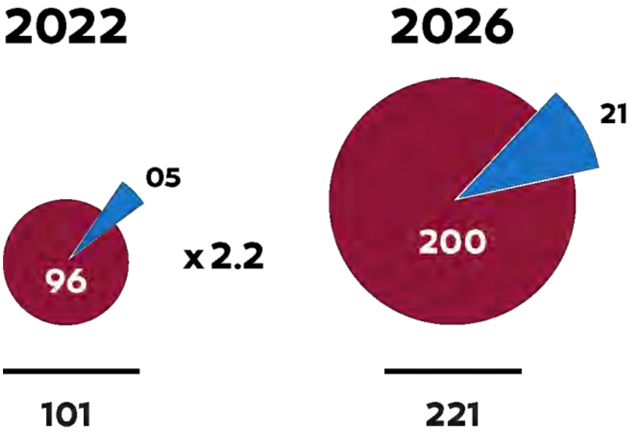
[18] Statista, Qatar's E-Commerce Outlook, , https://www.statista.com/outlook/dmo/ecommerce/qatar

[19] Statista, https://www.statista.com/statistics/871513/worldwide-data-created/

[20] Harvard Business Review (HBR), Leandro DalleMule, Thomas H. Davenport, What's Your Data Strategy?, https://hbr.org/2017/05/whats-your-data-strategy

[21] OECD, OECD Digital Economy Outlook 2020, https://www.oecd-ilibrary.org/science-and-technology/oecd-digital-economy-outlook-2020_bb167041-en

**Figure 11. Worldwide Global Data Forecast (Exabytes), 2022-2026**



**Unstructured data**

Emails, videos, images, voice, documents, reports and other data which are stored in their native formats (not in a defined and searchable format), both human and machine generated

Emerging technologies such as extended reality, artificial intelligence and machine learning will drive growth, especially of unstructured data

Source: IDC and Dell Technologies White Paper, July 2022[22]

Businesses and organizations are becoming increasingly conscious of the potential of data; in fact the global big data and business analytics market, which includes predictive analytics, business intelligence and data visualization, is expected to grow at a 13.5% CAGR until 2030 reaching USD 684bn[23].

This growth is fueled by evolving technologies that enhance the speed and quality of data analysis. For example, Artificial Intelligence (AI) provides new and faster ways of cleaning, organizing and analyzing big datasets, and for discovering patterns that provide more precise and more significant insights. AI can also be used across sectors to collect valuable data. In addition to AI, as organizations crave faster decision-making, real-time analytics and continuous analytics tools will also grow in importance as will cloud services and edge computing[24],[25]. Other expanding practices in data storage, usage and assessment will further shape the offering of data analytics instruments; for example, increasing data sharing within organizations and across different environments can drive the growth of composable data analytics tools and the data fabric, while the search for a deeper understanding of users and consumers calls for tools enabling context-enriched analysis[26].

Figure 12 illustrates the most relevant sources of data and some exemplary data analytics applications.

Besides bringing about enormous benefits, data explosion also comes with a unique set of challenges, with data security in particular gaining top priority: thousands of data breaches occur annually across industries, with important economic repercussions. For example, an IBM Security study of hundreds of companies around the world found that the Middle East (based on companies surveyed in the KSA and UAE) had the second highest average data breach cost among the 17 regions studied: approximately USD 7.46 million/breach. 45 percent of the breaches reported were cloud-based, and 60% of the breaches resulted in customers bearing increased prices[27]. Regulators, service providers, and consumers must collaborate to ensure responsible data management and protection.

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[22] IDC, High Data Growth and Modern Applications Drive New Storage Requirements in Digitally Transformed Enterprises, IDC Doc. #US49459722, July 2022, https://www.delltechnologies.com/asset/en-us/products/storage/industry-market/h19267-wp-idc-storage-reqs-digital-enterprise.pdf

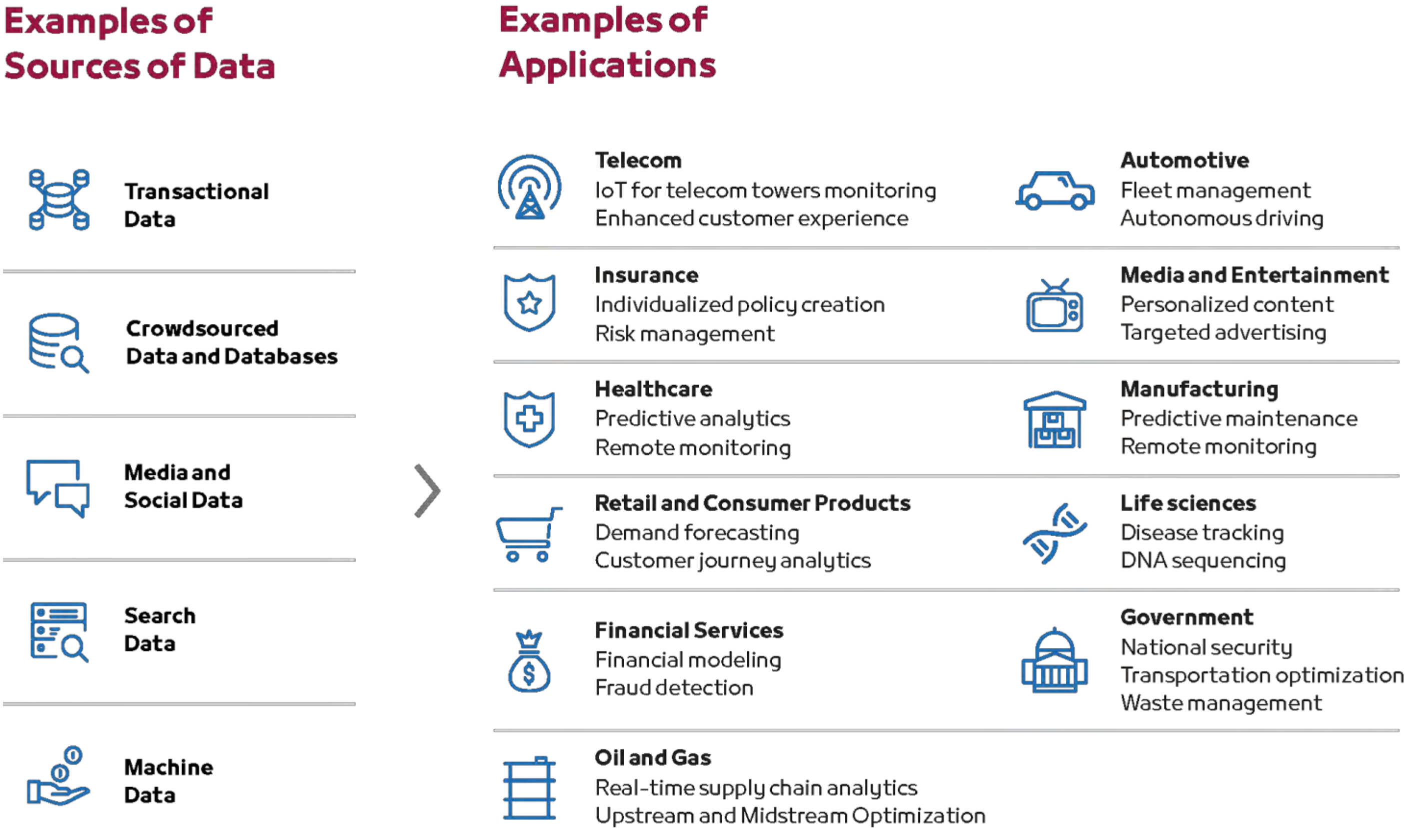
[23] Allied Market Research, Big Data and Business Analytics Market 2021

[24] Forbes, The Top 5 Data Science And Analytics Trends In 2023, https://www.forbes.com/sites/bernardmarr/2022/10/31/the-top-5-data-science-and-analytics-trends-in-2023/?sh=601be7825c41

[25] BCG, Unleash the Data Economy, https://www.bcg.com/publications/collections/data-economy

[26] Forbes, The Top 5 Data Science and Analytics Trends in 2023; Gartner, 12 Data and Analytics Trends to Keep on Your Radar, https://www.gartner.com/en/articles/12-data-and-analytics-trends-to-keep-on-your-radar; expert input

Figure 12. Data Sources and Applications


Examples of Sources of Data
Transactional Data
Crowdsourced Data and Databases
Media and Social Data
Search Data
Machine Data
Examples of Applications
Telecom
IoT for telecom towers monitoring
Enhanced customer experience
Automotive
Fleet management
Autonomous driving
Insurance
Individualized policy creation
Risk management
Media and Entertainment
Personalized content
Targeted advertising
Healthcare
Predictive analytics
Remote monitoring
Manufacturing
Predictive maintenance
Remote monitoring
Retail and Consumer Products
Demand forecasting
Customer journey analytics
Life sciences
Disease tracking
DNA sequencing
Financial Services
Financial modeling
Fraud detection
Government
National security
Transportation optimization
Waste management
Oil and Gas
Real-time supply chain analytics
Upstream and Midstream Optimization

Source: CRA ICT Sector Survey 2022
Note: illustrative and not exhaustive

## Relevance to Qatar

This trend is of key importance to Qatar as data analytics are fundamental to a range of IT applications, particularly regarding the implementation of Cloud First policies and smart use cases. This is evidenced through various big data analytics, artificial intelligence and cybersecurity initiatives across Qatar's ICT ecosystem:

- **Hamad Bin Khalifa University's Qatar Computing Research Institute (QCRI)** is a national research institute focused on developing technological and innovation capacity. Research topics include data analytics, cybersecurity, artificial intelligence, blockchain and other emerging technologies. QCRI created the Qatar Center for Artificial Intelligence (Q-CAI) in 2018 to help Qatar shape AI technology[28], with the Q-CAI playing a role in developing the National Artificial Intelligence Strategy in 2022[29].

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[27] IBM Security, Cost of a Data Breach, Report 2022, https://www.ibm.com/downloads/cas/3R8N1DZJ

- **National Cyber Security Agency** was established in 2021 by Emiri Decree to create and follow up on legislation related to cyber risks as well as personal data privacy. Additionally, this agency engages in local capacity building and conducts compliance checks to issue certificates and accreditation to private sector companies.
- **Sector Open Data Implementation** is a TASMU initiative working towards creating a single platform to facilitate openness, transparency and efficiency by consolidating data from all relevant stakeholders and governmental entities. This is an important step as it will allow private sector companies to develop their analysis, insights and digital products. Furthermore, this initiative can support MCIT's plans to enable more holistic usage of data across the government.
- **Analytics & AI Center of Excellence** is a TASMU initiative to be initiated soon with the aim to build distinct knowledge, assets and capabilities to accelerate the growth of analytics & AI in Qatar. It will also support technology adoption by publishing thought leadership papers, conduct advanced research, access cutting-edge technology and tools for testing solutions, and provide capacity building on best practices and methodologies.

As Qatar endeavors to grow its knowledge economy and become a global digital hub, emphasized focus around advanced data analytics and cybersecurity is a necessity. These developments will both support ICT sector growth and unlock potential across all industries.

## 3 – Smart environments such as smart homes and smart cities continue to gain traction with developments in and adoption of emerging technology

Emerging technologies like the Internet of Things (IoT), Artificial Intelligence/Machine Learning (AI/ML), cloud solutions and 5G are enabling the construction and operation of smart buildings, smart infrastructure and smart cities to offer a wide range of economic, social and environmental benefits. Beyond the hardware and software improvements that enable smart environments (Figure 13), large ecosystems like smart cities require extensive stakeholder collaboration to successfully plan and operate their infrastructure.

Smart environments benefit virtually all segments of society as use cases range from public health surveillance and predictive maintenance to smart power grids and intelligent traffic control. Smart cities, for example, can facilitate environmentally-friendly power distribution, traffic management, public sanitation, emergency services and building management. Smart environments are not limited to the municipal level and can be found everywhere from industrial manufacturing plants to residential homes.

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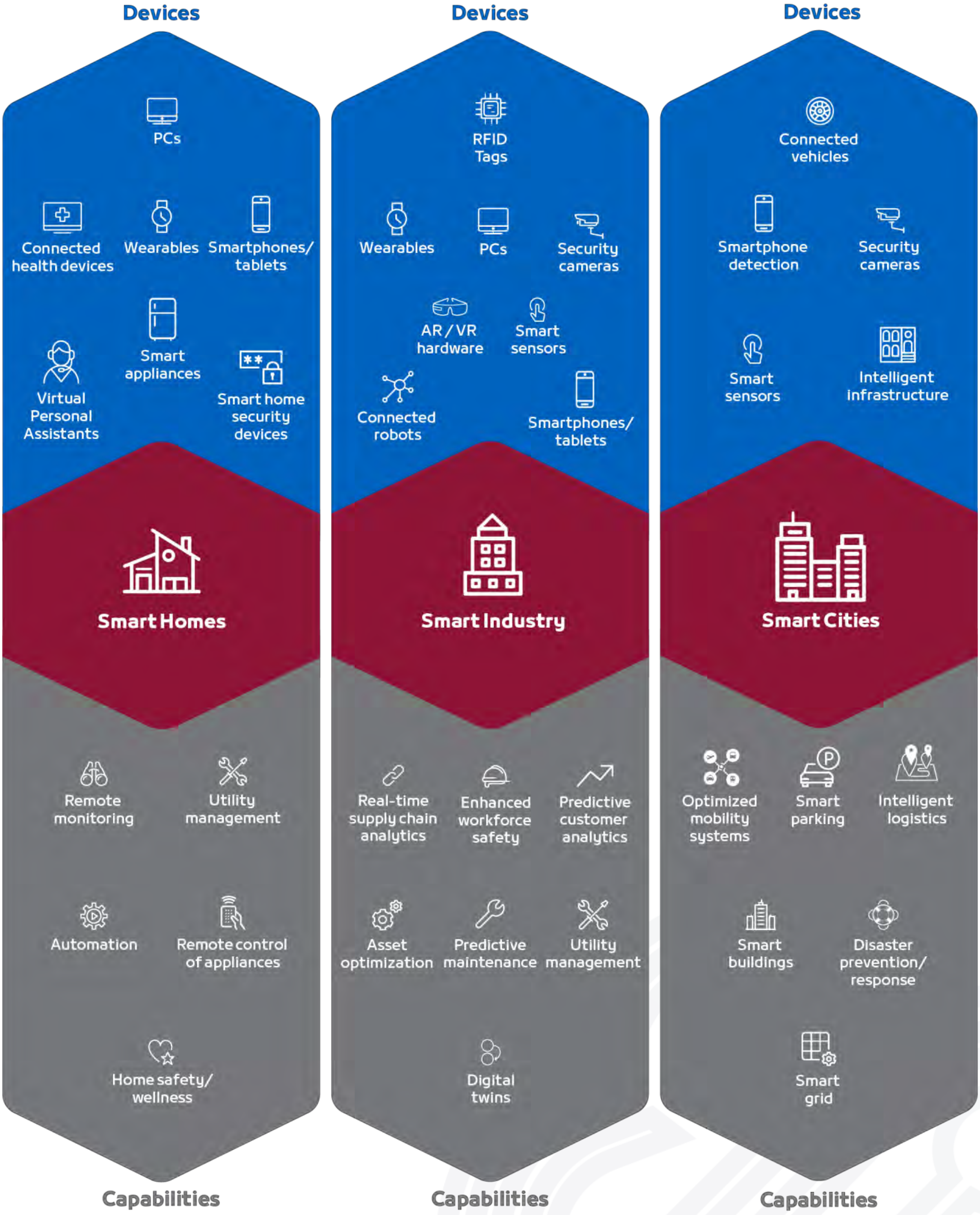
[28] Hamad Bin Khalifa University (HBKU) website, https://www.hbku.edu.qa/en/qcri/center-artificial-intelligence

[29] MOTC, National AI Strategy, https://www.motc.gov.qa/sites/default/files/national_ai_strategy_-_english_0.pdf

Figure 13. Benefits Offered by Smart Environments


Devices
PCs
Connected health devices
Wearables
Smartphones/ tablets
Smart appliances
Virtual Personal Assistants
Smart home security devices
Smart Homes
Remote monitoring
Utility management
Automation
Remote control of appliances
Home safety/ wellness
Capabilities
Devices
RFID Tags
Wearables
PCs
Security cameras
AR / VR hardware
Smart sensors
Connected robots
Smartphones/ tablets
Smart Industry
Real-time supply chain analytics
Enhanced workforce safety
Predictive customer analytics
Asset optimization
Predictive maintenance
Utility management
Digital twins
Capabilities
Devices
Connected vehicles
Smartphone detection
Security cameras
Smart sensors
Intelligent infrastructure
Smart Cities
Optimized mobility systems
Smart parking
Intelligent logistics
Smart buildings
Disaster prevention/ response
Smart grid
Capabilities

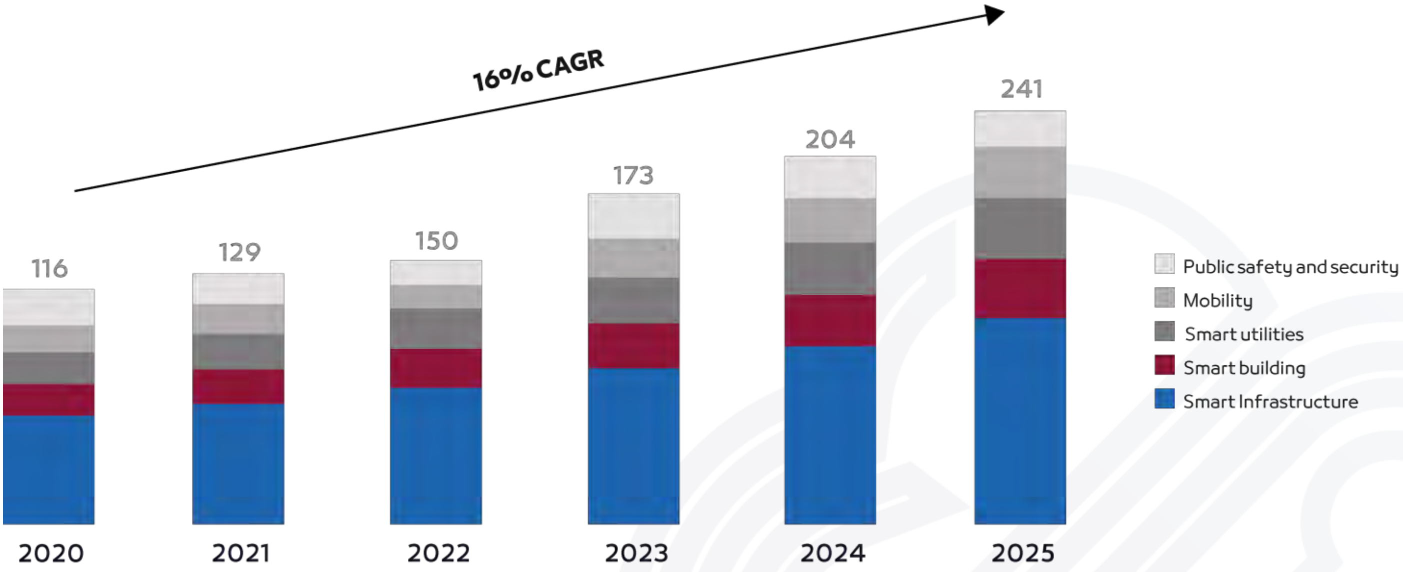
Source: CRA research based on multiple sources (not exhaustive)

## THE GLOBAL MARKET FOR SMART HOMES IN A SNAPSHOT [30]

- **USD 115.7bn** is the projected size of the global market for smart homes in 2022.
- **1.6x** expected growth by 2026.
- **14.2%** the estimated global household penetration of smart homes elements in **2022.**
- 2x expected growth of penetration of smart appliance by **2026.**
- Smart appliances are the largest segment, ranging from household assistants to connected washers and robotic vacuums.
- "Matter" is a unified standard for smart home devices which over 200 companies have agreed to use. This will greatly increase the compatibility of devices, will support the creation of smart ecosystems and drive the growth of smart appliances.

Cities around the world have begun showing interest in the industry by developing strategies, adjusting policies and regulations, and making significant investments to become smarter environments. The smart city global market is predicted to reach over USD 240bn by 2025 with smart infrastructure, buildings and utilities representing the top three domains of investment (Figure 14).

**Figure 14. Projected Revenue of the Smart City Market Worldwide 2020-2025, By Segment (USD bn)**



Source: Statista

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[30] Statista, Statista Digital Markets – Smart Homes, https://www.statista.com/outlook/dmo/smart-home/worldwide

There have been various initiatives across the GCC as the region endeavors to become smarter and more sustainable for its residents, with key GCC smart city initiatives summarized below to demonstrate the scale and scope of such projects.

**Table 1. Smart City Initiatives Across the GCC**

| Initiative | Country | Date of Establishment | Budget (USD bn) | Description | Features |
|---|---|---|---|---|---|
| **Masdar City** | 🇦🇪 | 2006 | 22 | Designed to be a low-carbon, sustainable urban community which operates as a business free-zone and includes residential, commercial and public amenities | Smart mobility, eco-buses, clean energy conversion and zero-carbon infrastructure capabilities |
| **Lusail Smart City** | 🇶🇦 | 2008 | 45 | A government-funded project established to support the knowledge economy, reduce hydrocarbon reliance and enable the Qatar National Vision 2030 | Sustainable infrastructure, a district-wide cooling system, vehicular recharging stations and eco-friendly landscaping |
| **Msheireb Downtown Doha** | 🇶🇦 | 2010 | 7 | The first sustainable downtown regeneration project combining traditional Qatari elements with the latest technology | LEED Gold- or Platinum-certified buildings, waste management, building management, customer relations and utilities monitoring |
| **NEOM** | 🇸🇦 | 2017 | 500 | A planned zero-carbon megaproject and business zone which will incorporate the latest technology and smart features to diversify KSA's economy | Smart water pressure, temperature and quality monitoring, green rapid public transit system |
| **TASMU Smart Qatar Program** | 🇶🇦 | 2017 | 1.6 | A program to help transform Qatar into a smart nation by leveraging digital technologies to support Qatar's economic and sustainability goals | Initiatives span over 100 smart use cases focusing on transportation, logistics, healthcare, environment and sports |
| **Silicon Park** | 🇦🇪 | 2017 | 0.35 | Developed in support of UAE Vision 2021, this is a smart city promoting societal cohesiveness, public safety and environmental sustainability | Smart home solutions, smart facility management, sustainability-oriented IoT solutions |

| Initiative | Country | Date of Establishment | Budget (USD bn) | Description | Features |
|---|---|---|---|---|---|
| **Yanbu Industrial Smart City Project** | 🇸🇦 | 2017 | N/A | In line with KSA Vision 2030, it supports industrial and commercial objectives through advanced IT solutions | Vehicle management, waste management, street lighting, energy management and crowd analytics |
| **Ras Al Hamra Smart City** | 🇴🇲 | 2021 | N/A | Initiated to support Oman Vision 2040 and to help improve the intelligence and sustainability of Omani cities through IoT | Utility monitoring, smart lighting, waste management, irrigation |
| **ALNAMA Smart City** | 🇸🇦 | 2022 | N/A | A 10-square-kilometer, zero-carbon smart city designed to support residential, commercial, educational, medical and touristic needs | Water and waste recycling, powered entirely by renewable energy |

Source: CRA

## Relevance to Qatar

Qatar's national initiatives to develop smart ecosystems and a number of smart city initiatives from neighboring countries are indicative of significant demand for smart solutions in the region.

The Qatar Mobility Innovations Center (QMIC) was established in 2009 by Qatar University as the first innovation center in the region with a focus on developing and deploying innovative solutions to enable smart living. QMIC provides market-ready, locally-built smart platforms and solutions, as well as customized innovative platforms through an innovation-as-a-service approach and consulting services. After a phase between 2013 and 2019 in which the center focused on building platforms, solutions and databanks, the center is now scaling up in the commercialization of such products; in particular, QMIC has been leading in delivering IoT platforms and solutions in areas as transport, logistics and telematics, road safety and environment.

The TASMU Smart Qatar Program, established in 2017 with a budget of QR 6bn to support and accelerate progress towards the Qatar National Vision 2030, promotes Qatar's transition into a digital, future-proof ecosystem. In March 2022, the TASMU Platform, an MCIT initiative in collaboration with Ooredoo, won the Government and Citizen Engagement Category at the World Summit Awards[31]. The platform provides smart service integration and interoperability across city services in an ecosystem which leverages best-practice security and governance. Overall, the TASMU program includes over one hundred smart use cases; some solutions that have already been implemented and will benefit the 2022 FIFA World Cup are the digital twin capability[32] which is currently supporting Mowasalat (Karwa) with crowd management[33], and the smart parking initiative[34]. Other use cases soon to follow include an athletic performance dashboard and a chronic disease monitoring solution, both of which are expected to contribute to support TASMU's "access to medical care" objective.

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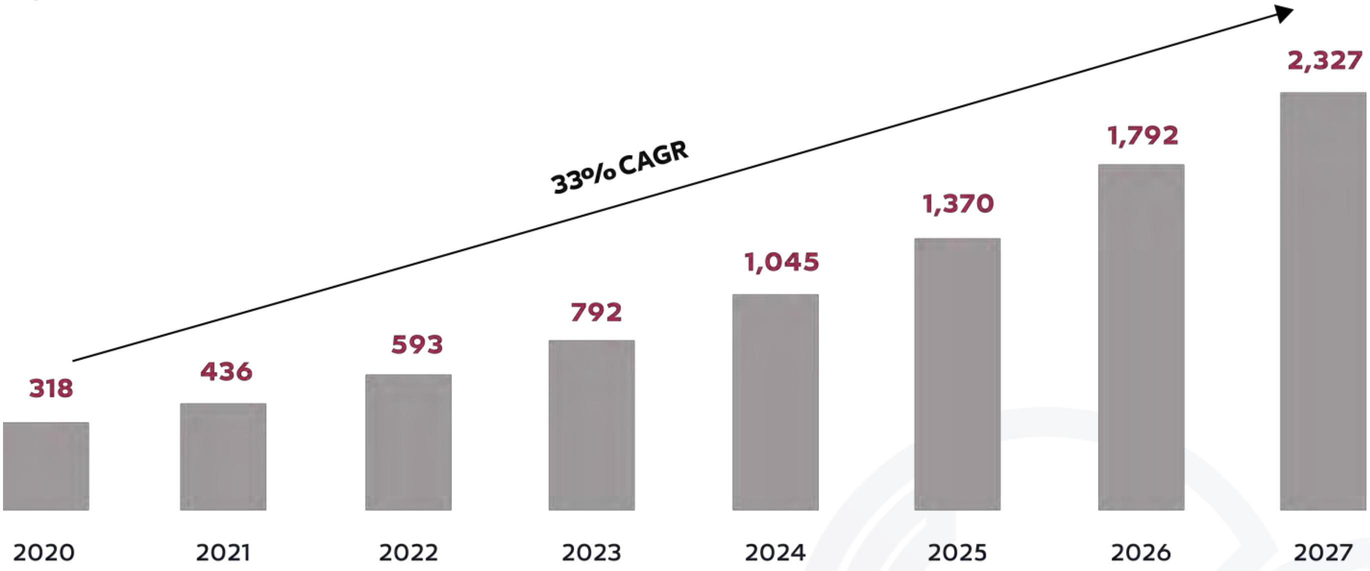
[31] Ooredoo press release, March 26, 2022, https://www.ooredoo.qa/web/en/press-release/tasmu-platform-key-qatari-project-backed-by-ooredoo-recognised-at-prestigious-international-awards-event/

In January 2021, Vodafone Qatar and Microsoft announced the strengthening of their existing partnership to provide more digital solutions across the country by integrating their technologies. This includes leveraging Microsoft Azure as Vodafone's primary IoT platform[35]. Similarly, in March 2022, Ooredoo Qatar, Siemens and Microsoft signed an MOU to develop IoT and other emerging technology solutions for various use cases primarily related to infrastructure in Qatar[36]. One IoT use case currently underway is the installation of smart meters to remotely read water and power consumption by the Qatar General Electricity and Water Corporation (Kahramaa). With hundreds of thousands of meters installed in partnership with Vodafone and Siemens, this system has already resulted in significant improvements for both customers and Kahramaa[37].

Smart city transformations in Qatar will continue, also driven by the impetus of major international events like the 2022 FIFA World Cup, the 2023 AFC Asian Cup, Expo 2023 Doha and the 2030 Asian Games. Given these initatives, Qatar's IoT market is expected to experience a 31.5% CAGR from 2022 to 2027, mainly in the home and building automation segments (Figure 15).

**Figure 15. Qatar's IoT Market Size (USD mn)**



Source: Mordor Intelligence

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[32] A virtual representation of real-world physical systems or processes

[33] Hukoomi news, 06 April 2022, https://hukoomi.gov.qa/en/news/tasmu-platform-showcases-digital-twin-capabilities

[34] MCIT news, October 27 2022, https://www.mcit.gov.qa/en/media-center/news/launch-%E2%80%9Csmart-parking%E2%80%9D-platform-%E2%80%93-first-comprehensive-digital-parking-service

[35] Vodafone press release 9 January 2021, https://www.vodafone.qa/en/about-us/media/press-release/vodafone-and-microsoft-further-strengthen-their-strategic-partnership

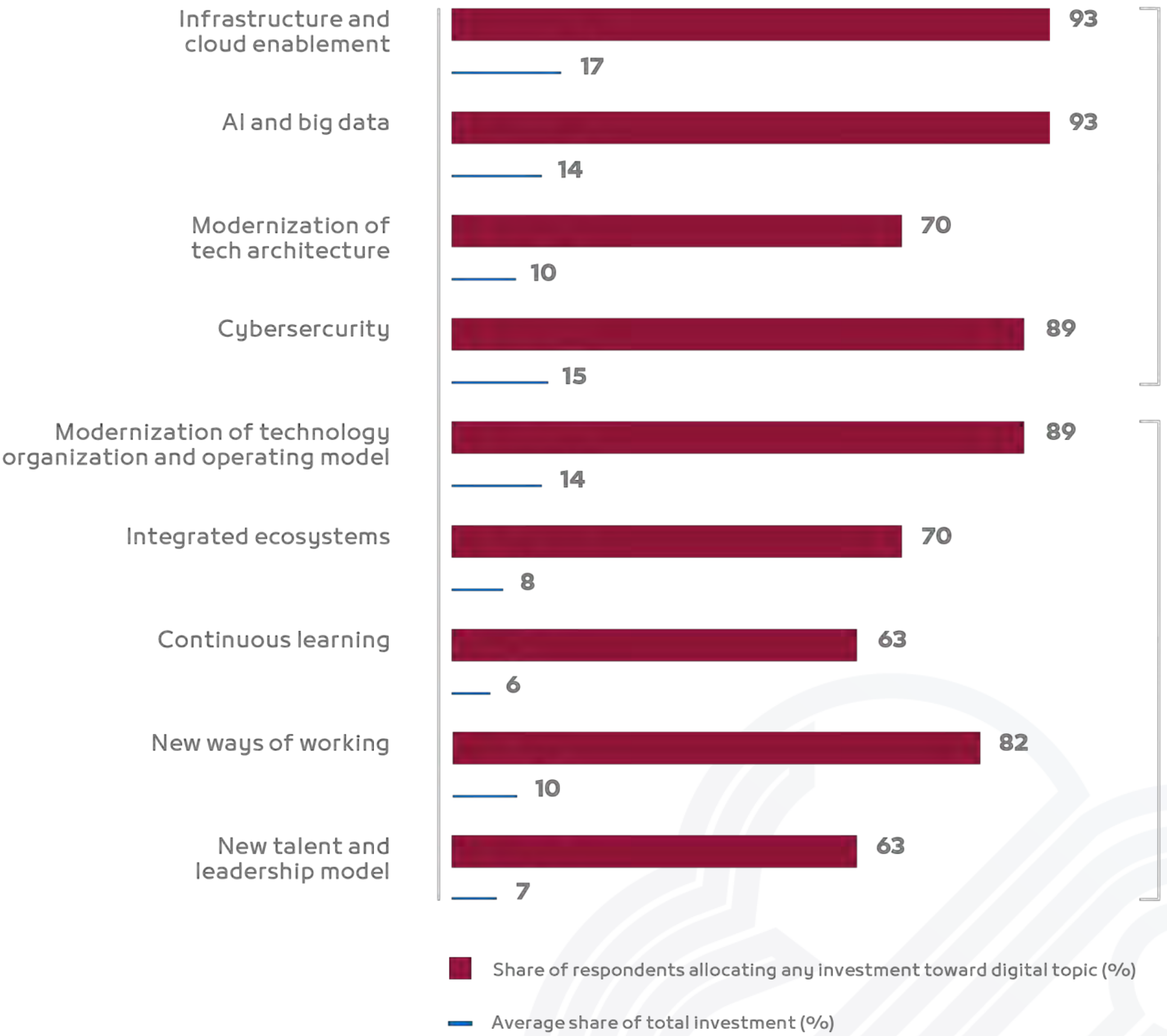
[36] Microsoft News Center, April 5 2022, https://news.microsoft.com/en-xm/2022/04/05/ooredoo-siemens-and-microsoft-sign-memorandum-of-understanding/

[37] Kahramaa news, November 2 2022, https://www.km.qa/MediaCenter/Pages/NewsDetails.aspx?ItemID=370

Despite recent developments, Qatar still has some strides to take to live up to the vision of becoming a smart nation: further investments in ICT infrastructure and public private partnerships are key to developing smart environments, enabled by an adequate supply of IoT and other emerging technologies across all sectors. With intensifying global competition, these efforts are essential to attracting the necessary highly skilled talent and enhancing Doha's ability to better serve its citizens and residents across services, from health, to education, to public administration.

## 4 – The ICT market structure is changing through M&A and delivery models are shifting, driving demand for cloud solutions and XaaS

Figure 16. Global Corporate Investment Allocations to Digital Enablers in the Next 2-3 Years



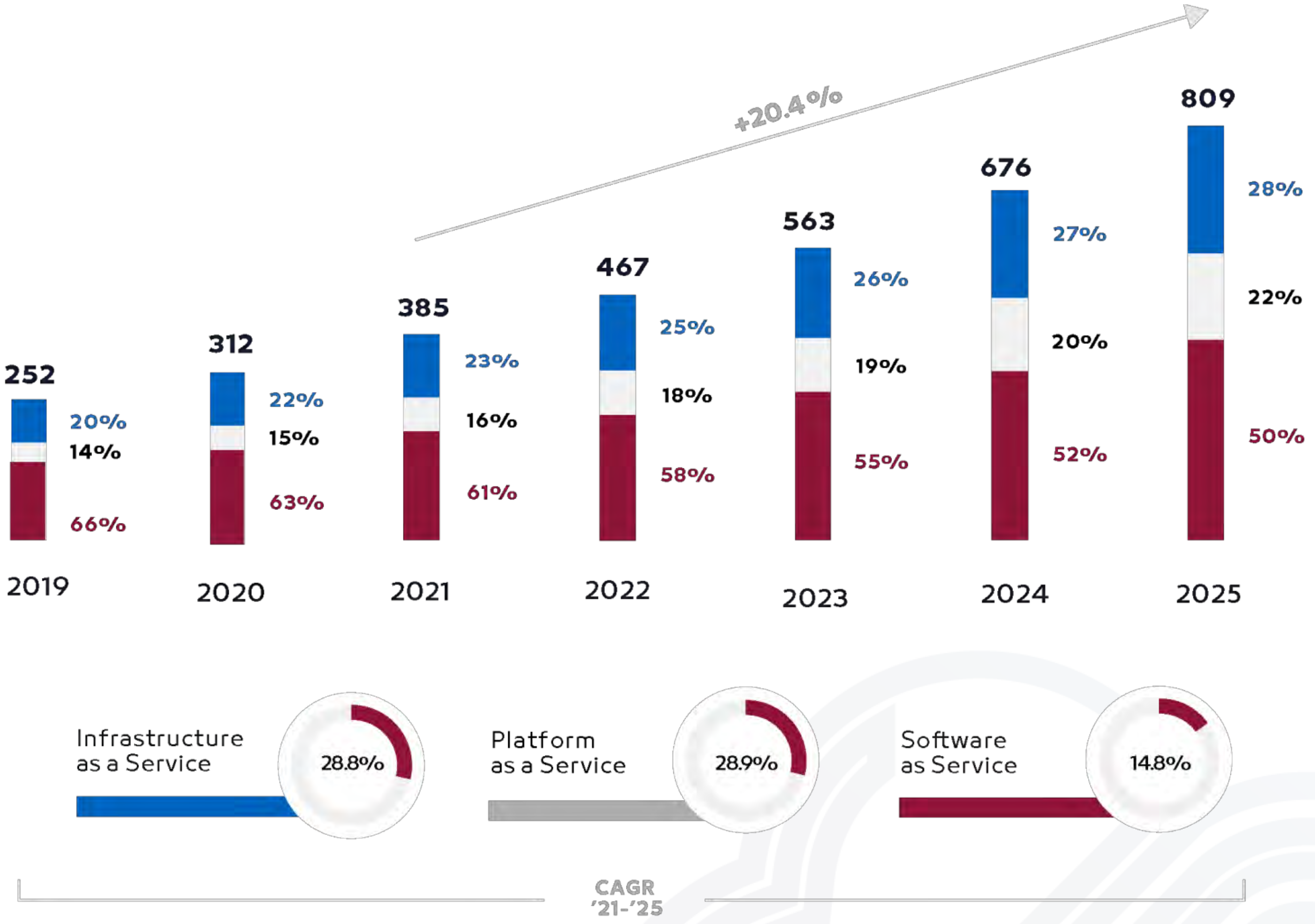
Source: 2021 BCG Global Digital Transformation Survey

The ICT supply-side landscape is undergoing structural changes due to integration across value chains as well as the proliferation of new product and service delivery models.

Merger and acquisition (M&A) deals as well as internal investments are driving value chain integration. The TMT/ICT sector saw unprecedented M&A activity in 2021: for example, approximately 40% of all deals globally in the first half of the year involved a TMT company[38].

To further support value chain integration, drive value creation and enable new delivery models, many companies are targeting digital investments. In fact, 90% of IT service companies reported spending an average of 60% of their digital enabler budget on investments in infrastructure and cloud enablement, AI and big data, cybersecurity and modernization of their technology organizations (Figure 16).

**Figure 17. Revenue of Worldwide Public Cloud Services (USD bn)**



Source: IDC Semiannual Public Cloud Services Tracker, 2020H2
Note: Public cloud services represent one segment of the overall cloud market

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[38] AON, The Digital Evolution and the Role of the TMT Sector, https://www.aon.com/industry-insights/digital-evolution

As businesses and organizations across all industries are introducing new operating models, many are leveraging cloud services and XaaS ("Anything as a Service") solutions. The XaaS market alone is forecasted to experience a 28% CAGR from 2021 to 2028 when it could reach USD 2.4tn globally[39]. Of particular importance is the public cloud services market[40]: the IDC estimates this market to grow to around USD 800bn by 2025 (Figure 17). These developments are altering the market landscape, supporting creation of new operating models, and driving increased demand for cloud services, thus requiring ICT companies to adapt their portfolios and adopt agile ways of working.

## Relevance to Qatar

The government of Qatar's current focus on cloud adoption opens up various substantial opportunities, transcending Qatar's small economy and enabling it to become a full-fledged digital hub on the regional and global stage. To accomplish this goal and build on previously established policies, further efforts from both the public sector and the industry must be made to continuously adapt the regulatory environment to environmental evolutions, secure data storage and supply sufficient IT infrastructure and services.

Qatar's cloud computing market is expected to more than double in the next four years (Figure 18). Multinational companies like Microsoft and Google have already entered the local market and are making significant investments in Qatar's cloud infrastructure (see following sections for details).

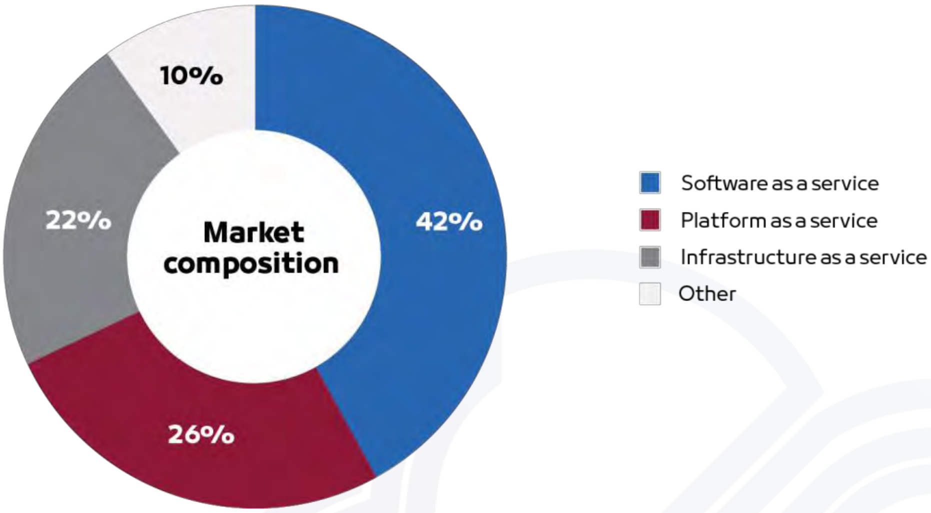
**Figure 18. Qatar's Cloud Computing Market Size, Growth and Composition**

**USD 119mn**

Estimated market size 2022

**2.5x**

Estimated growth by 2026



Source: TASMU Digital Valley[41]

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[39] GlobeNewswire, March 01 2022, https://www.globenewswire.com/news-release/2022/03/02/2394958/0/en/Everything-as-a-Service-XaaS-Market-to-Rise-at-a-Rapid-Rate-Improved-Business-Agility-and-Increasing-Operational-Efficiency-to-Aid-Growth-Fortune-Business-Insights.html

[40] A model where third-party service providers offer computing services available on demand over the public internet. Differently from private clouds, public clouds do not require users (companies or individuals) to purchase and maintain on-premises hardware and applications

[41] TASMU Digital Valley website, https://tdv.motc.gov.qa/Investment-Catalogue/cloud-computing

## 5 – Competition for skilled tech workers is high globally as demand far outweighs supply

Left unchecked, Korn Ferry estimates a gap of 4.3mn skilled workers in technology, media and telecommunications globally by 2030, equivalent to 59 times the number of Alphabet employees[42]. Similarly, Huawei sees the current global and cross-sector talent gap at 200mn people, with the top ten hardest jobs to fill in STEM professions[43]. With demand intensifying for highly-skilled labor, the gap can represent an imminent threat to global digital development and talent is increasingly becoming a key competitive advantage in the ICT sector. IT executives interviewed by Gartner in 2021 claimed that talent shortage was the biggest adoption barrier[44] to 64% of emerging technologies compared to just 4% the year prior. Furthermore, they listed talent availability as the primary adoption risk factor in 75% of IT automation technologies and 41% of digital workplace technologies[45].

### Relevance to Qatar

### SELECTED ICT SKILLING INITIATIVES

- MCIT and Microsoft have launched the National Skilling Program which will provide digital skill training to 50,000 people by 2025[46].
- As part of the National Skilling Program, the Digital Center of Excellence was created in a collaborative effort between MCIT, Microsoft and elev8 to skill, upskill, and reskill students and those already in the workplace on advanced technical topics like AI, cybersecurity, and cloud computing[47].
- The Qatar Digital Government Training Program was created to increase the pool of ICT talent available to assist in the government's digital transformation; so far, this initiative has provided training to over 1400 individuals.
- Huawei plans on training 10,000 individuals on 5G, AI and cloud technology by 2024 through partnerships with Qatar University, Hamad Bin Khalifa University and Community College of Qatar (Huawei ICT Academy Lab)[48].
- Google Cloud has established a Center of Excellence which provides cloud certifications and digital skills training while also functioning as a technology incubator[49]. The program will transition from a virtual to physical cente by 2023. More than 4,000 participants have been trained to date (2021/2022).

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[42] Korn Ferry, Future of Work – the global talent crunch, https://focus.kornferry.com/wp-content/uploads/2015/02/The-Global-Talent-Crunch.pdf

[43] Huawei Blog, May 24 2021, https://blog.huawei.com/2021/05/24/addressing-global-ict-talent-shortage/#:~:text=However%2C%20the%20ICT%20industry's%20rapid,to%20fill%20in%20STEM%20professions

[44] i.e., a factor inhibiting adoption of some technology domains by companies

[45] Gartner press release, September 13 2021, https://www.gartner.com/en/newsroom/press-releases/2021-09-13-gartner-survey-reveals-talent-shortages-as-biggest-barrier-to-emerging-technologies-adoption

[46] Microsoft news, March 17 2022, https://news.microsoft.com/en-xm/2022/03/17/the-ministry-of-communications-and-information-technology-and-microsoft-officially-launch-the-national-skilling-program-and-inaugurate-the-digital-center-of-excellence-in-msheireb-downtown-doha/

[47] Elev8 press release, https://www.elev8me.com/insights/qatar-digital-center-of-excellence-launch

[48] Stakeholder interviews and Qatar tribune March 21 2022, https://www.qatar-tribune.com/article/231444/NATION/Huawei-opens-ICT-Academy-Lab--at-Community-College-of-Qatar

[49] Google's input to the CRA's ICT sector research study through an interview (primary research)

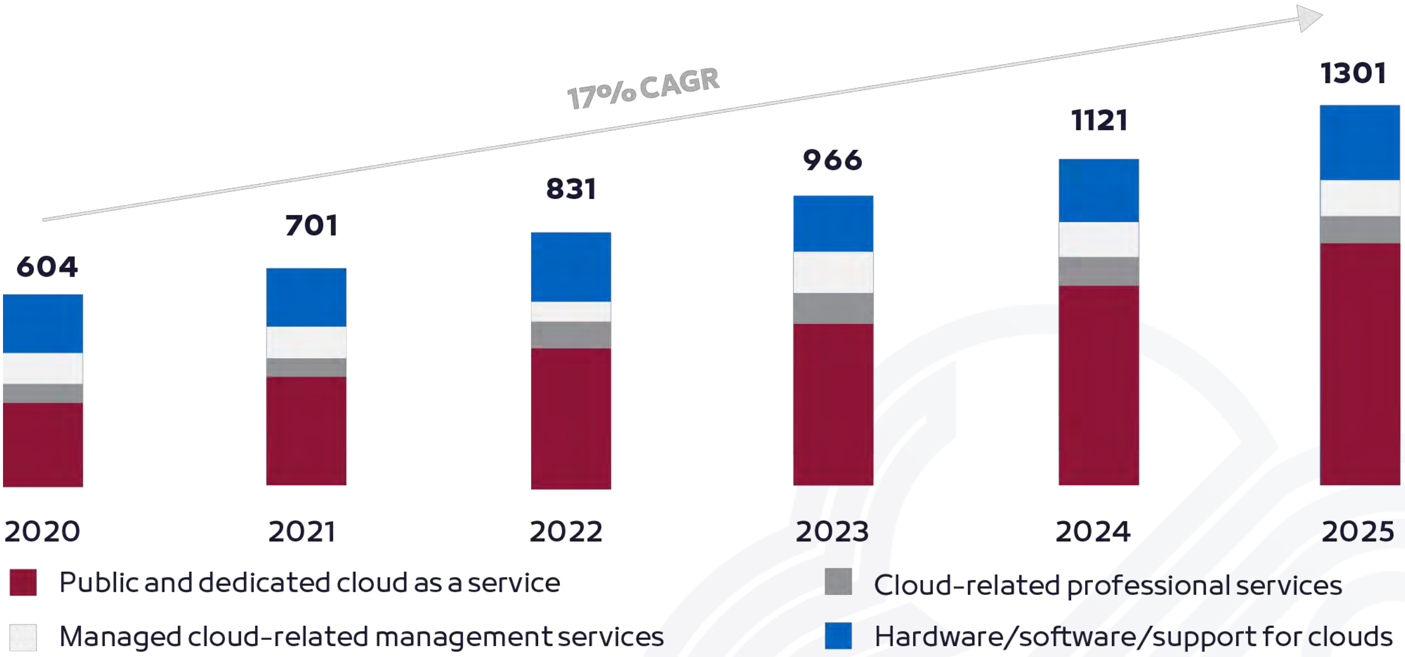
The global shortage of tech talent is particularly relevant to Qatar given its expat-based economy: according to the CRA ICT Sector Survey 2022, around 60% of ICT companies in Qatar which are looking to hire find it difficult to do so. National and company-level policies are needed to attract the required foreign talent, from quality of life and immigration policies to remuneration, company training and upskilling policies. Concurrently, local talent development is expected to be also driven further as a major factor by the projected demand growth for digital.

Besides hosting relevant university programs, Qatar has started addressing the ICT talent gap through various skilling initiatives.

## 6 – Infrastructure, particularly that required for 5G and data centers, is more important than ever as an enabler of the ICT market

Telecommunications infrastructure, especially 5G, is a key enabler of other technological innovations such as IoT and smart ecosystems. It breaks ground for pivotal shifts in market landscape, particularly regarding the ICT, supply chain and healthcare segments. The primary value-add of 5G technology comes from the networks' ability to offer low latency, high-speed connections with significantly improved traffic capacity. Globally, 5G adoption and rollout is resulting in the sale of legacy infrastructure, increased rates of tele-communications M&A, telecommunications cooperation/partnership regarding network sharing and technology standard development, and concerns regarding the national security of critical infrastructure[50].

**Figure 19. Worldwide Whole Cloud Revenue Snapshot 2020-2025** (USD bn)



Source: IDC, 2021

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[50] Baker McKenzie, 5G as a Driver of Digital Transformation –Report 4, https://www.bakermckenzie.com/-/media/files/insight/publications/2022/06/tmt-looking-ahead--report-4--5g-as-a-driver-of-digital-transformation.pdf

With growth in the IoT space and widespread 5G availability driving big data creation, there is increasing demand for data storage and processing solutions. Global storage capacity is therefore expected to grow with a CAGR of 19.2% between 2020-2025[51]. Organizations are increasingly adopting cloud and edge storage and computing. Cloud and edge solutions have different use cases and are at different development stages: edge computing has an approximate global market of USD 11bn in 2022. Starting from a small base, the segment is becoming more mainstream and is expected to experience immense growth with a 2022-2030 CAGR of close to 40%[52]. The cloud market, in contrast, is a mature technology and is forecasted to grow at a lower 17% CAGR from 2020 to 2025, but to reach a market size as high as USD 1.3tn globally in 2025[53] (Figure 19). Global investments in data centers are growing and enabling edge and cloud solutions; in fact, year-on-year investment doubled in 2021, totaling almost USD 60bn with the number of transactions increasing over 60%[54]. Growth in data center infrastructure will continue as the global knowledge economy expands.

**Relevance to Qatar**

Qatar is a leader in the adoption of 5G technology and can enjoy significant leverage in terms of universal coverage of both mobile and fixed networks, a very high population penetration rate of digital devices and services, and continuous infrastructure development. Qatar's investment in ICT infrastructure has been extensive over the past decade and the local ICT industry perceives the overall infrastructure as strong. Recent key developments include the comprehensive 5G rollout by Ooredoo and Vodafone, the setup and expansion of Qatar's Internet Exchange Point (IXP) and the development of local data centers, including the opening of Microsoft's global data region in the country. Qatar can now leverage its state-of-the-art infrastructure to grow cloud and edge computing services and become a digital hub; however, in order to further develop the market, some challenges still need to be addressed, particularly related to the cost of connectivity services[55].

## 7 – New governance models are required to create fast-adapting policies that keep up and enable technological innovation while mitigating risks

The adoption of disruptive technologies can cause changes to the ecosystem where they are used, for example to "social interactions and relationships, organizational structures, institutions, public policies and, sometimes, the physical environment" (Schuelke-Leech 2018[56]).

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[51] International Data Corporation (IDC), https://www.idc.com/

[52] Research and Markets, Global edge computing market size, share & trends analysis, https://www.researchandmarkets.com/reports/4538733/global-edge-computing-market-size-share-and

[53] International Data Corporation (IDC), https://www.idc.com/

[54] DLA Piper, The meteoric rise of the data centre: Global data centre investment outlook, June 2022

[55] See the section on *Infrastructure* in this report for further details

[56] *A model for understanding the orders of magnitude of disruptive technologies* Beth-Anne Schuelke-Leech, 2018, https://www.sciencedirect.com/science/article/abs/pii/S0040162517314610

Therefore, policies and regulations need to adapt and evolve rapidly to enable fast technological adoption and innovation while mitigating the risk of negative impact on the ecosystem, consumers and vulnerable population groups.

Areas attracting regulatory attention globally are cybersecurity, data protection and privacy, consumer protection, anti-misinformation/illegal content and competition. Furthermore, increasing uptake of AI, blockchain/ledger technology and IoT are raising considerations around the regulatory changes needed across sectors in relation to new technologies. Some topics under considerations are, for example, the responsible application of AI in different domains, smart contracts relying on the ledger, digital technologies in finance and the sharing economy among others.[57]

Some global regulatory best practices are emerging in countries that have managed to issue policies that adapt to the challenges of technological evolutions. One example is the EU General Data Protection Regulation (GDPR) which gives individuals more control over their personal data while providing sufficient flexibility in implementation[58]. Other examples are the proposal to assign legal personality to Artificial Intelligence (AI) which is being considered in Estonia, and the European Commission's proposed legal framework for the implementation of responsible AI[59].

**Figure 20. Fundamentals of a Sound and Future-Proof Regulatory Framework**

**8**

**fundamentals of a sound and future-proof regulatory framework**

1. Clearly articulate regulatory strategies for digital
2. Integrate sustainability into regulatory frameworks
3. Aim at maximizing benefits while minimizing harms of digital technologies
4. Adopt an open, inclusive and transparent regulatory process
5. Leverage multiple formats and modes of regulation e.g., leaving space for self-regulation or hybrid
6. Deploy good governance and effective institutions with appropriate mechanisms in place for collabrative regulatory approaches
7. Follow an evidence-based approach
8. No rule should be set in stone

Source: ITU G5 Accelerator

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[57] OECD, Case Studies on the Regulatory Challenges Raised by Innovation and the Regulatory Responses, 2021, https://www.oecd.org/publications/case-studies-on-the-regulatory-challenges-raised-by-innovation-and-the-regulatory-responses-8fa190b5-en.htm

[58] Oxford Business Law Blog, https://blogs.law.ox.ac.uk/business-law-blog/blog/2018/11/legal-and-regulatory-implications-disruptive-technologies-emerging

[59] European Commission, Shaping Europe's digital future, https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai

According to the OECD[60], governments can take different approaches to address the challenges and risks of technology: from preventing adoption and adopting a "wait and see" approach which tackles specific risks once they materialize, to piloting innovative approaches such as sandboxes (i.e., fixed-term regulatory exceptions) or self-regulation. Given the dynamic evolution of the sector, the appropriate mix of approaches demands periodic adaptation.

The disruptive and cross-sectoral changes brought about by technological innovation require an increasing collaboration among regulators and between regulators and other industry players to enable effective policymaking[61]. Information asymmetries must be circumvented through collective stakeholder efforts at all stages of both technical and legislative development. This will support a regulatory environment that is more representative, informed and relevant to the industry, consumers and the government. Stressing the importance of collaborative decision-making, the ITU (UN ICT agency) has created the G5 Accelerator, a platform that brings together high-value tools and resources to support countries in developing collaborative digital policies and regulation. Resources include a set of eight fundamental principles to building a sound and future-proof regulatory framework which highlights good governance as one of the key factors (Figure 20).

## Relevance to Qatar

Similar to other countries, Qatar has identified areas where it can further enhance regulatory norms to enable ICT growth and digital adoption: the CRA ICT Sector Survey 2022 found that although the majority of local ICT companies believe the overall regulatory setup in Qatar is attractive and internationally competitive, a considerable 40% do not fully agree. Multiple industry stakeholders interviewed call for improvements in the regulatory processes and in cross-government entity collaboration (see the following chapters for further details).

The 2021 ITU G5 Benchmark[62] found Qatar to be among the leaders in collaborative digital regulation in the Arab region. However, it only ranked 3rd in the GCC[63], indicating that room for improvement exists. As Qatar strives for regional leadership, it has a unique chance to learn from the example of global leaders while setting best practices within the region through initiatives like the creation of regulatory sandboxes or other cutting-edge policies. Leveraging these opportunities could open the market to new players and increase demand for local IT services such as data storage and processing.

On its journey to becoming a global digital hub, Qatar has been significantly updating its ICT policies and its general regulatory approach. These actions range from development of specific regulations for companies operating within the Qatar free zones to development of the Qatar Central Bank's digital payment licensing process and regulatory sandbox for fintech, to the CRA's recent publishing of a comprehensive cloud policy framework and spearheading initiatives to foster the adoption of emerging technologies. The cloud policy was highly anticipated by market players and is expected to significantly support expansion of the domestic cloud services market. Continued public sector initiatives, policy developments and collaboration among stakeholders will assist the government in maintaining a strong and supportive regulatory ecosystem that matches that pace of innovation with other global ICT developments.

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[60] OECD, Case Studies on the Regulatory Challenges Raised by Innovation and the Regulatory Responses, 2021, https://www.oecd.org/publications/case-studies-on-the-regulatory-challenges-raised-by-innovation-and-the-regulatory-responses-8fa190b5-en.htm

[61] ITU Publication, Global ICT Regulatory Outlook 2020, https://www.itu.int/dms_pub/itu-d/opb/pref/D-PREF-BB.REG_OUT01-2020-PDF-E.pdf

[62] Assesses the breath (i.e., how authorities collaborate) and depth (i.e., whether the regulators have engaged in informal, formal or hybrid collaboration mechanisms) of collaboration in policy making

[63] ITU G5 Benchmark, https://digitalregulation.org/wp-content/uploads/G5Benchmark_ReviewBoardReport_21062021.pdf

## 8 – Centralized innovation platforms and ecosystems are growing in popularity as stakeholders attempt to accelerate the pace of innovation

**Figure 21. Primary Factors to Strengthen Innovative Ecosystems**

- Build human capital capacity
- Accessible innovation financing
- Strong market and research infrastructure
- Supportive government regulation
- Foster innovative and entrepreneurial culture
- Strong social networking ties between stakeholders
- Equitable and inclusive ecosystem participation and oversight
- Streamlined channels for scaling innovation
- Collective stakeholder approach to address development challenges

Source: Strengthening Innovation Ecosystems (IDIA)

Platforms which facilitate business opportunities and lower barriers to entry play a significant role in supporting growth within the ICT sector, particularly for the SME segment. Business incubators and accelerators are core elements of innovative ecosystems as they provide training, resources and access to relevant networks and business opportunities. On a global level, 41% of incubators and accelerators are sponsored by universities and 20% by public entities, while the remaining share is represented by private and corporate incubators[64]. This emphasizes the key role of governments in stimulating innovation, but also the non-negligible part that the private sector can play if properly enabled.

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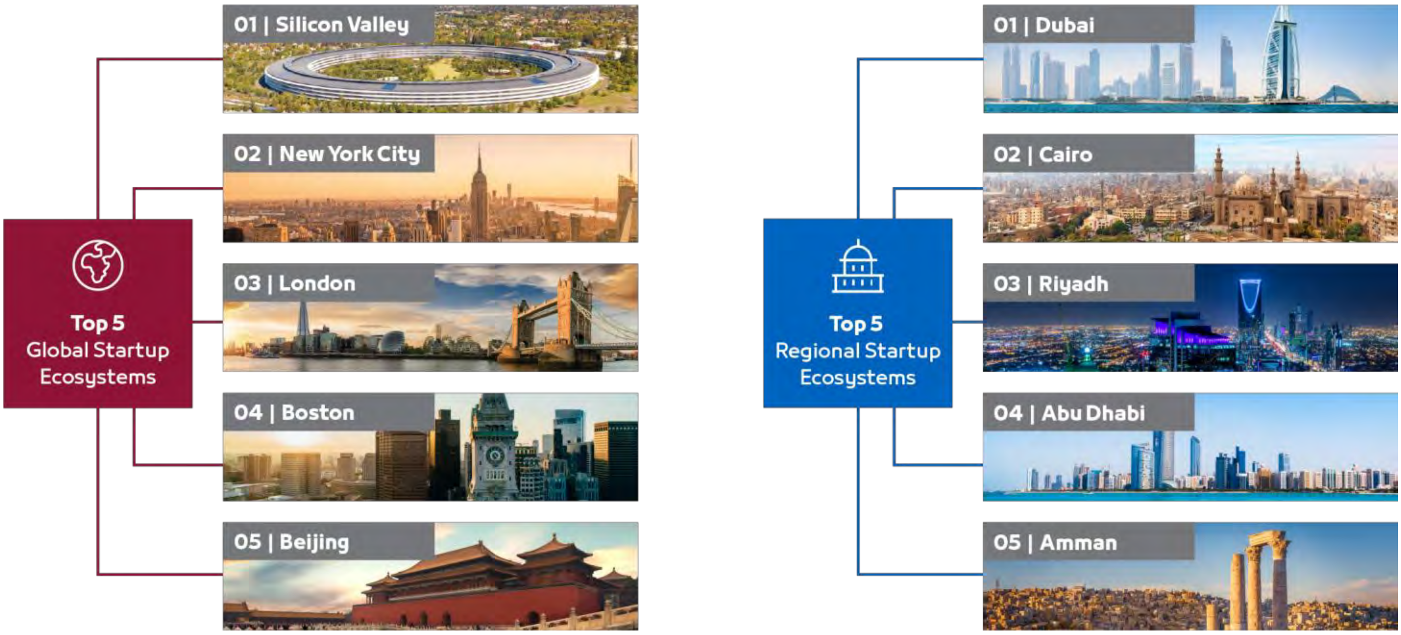
[64] UBI Global World Benchmark Report 2019-2020,

Research by the International Development Innovation Alliance (IDIA) has identified the primary factors which help to strengthen innovation ecosystems (Figure 21); they highlight the need for a strong infrastructure filled with diverse, collaborative stakeholders from all sectors.

The IDIA's Global Startup Ecosystem Report ranks innovation ecosystems based on funding, market reach, talent and experience, connectedness, knowledge and performance[65]. The top global and regional ecosystems from this index are shown in Figure 22.

**Figure 22. Highest-Ranked Global and Regional Startup Ecosystems[66]**



Source: Global Startup Ecosystem Report 2022

## Relevance to Qatar

While incubation and acceleration platforms have been a longstanding element of innovative ecosystems globally, Qatar is still in the process of developing and bolstering its own ecosystem. Qatar's public and private sectors have already demonstrated support of startups and innovation through a number of incubators, accelerators and research institutes (Figure 23); these engage in a variety of initiatives to support every aspect of the innovative landscape from R&D and incubation to networking. For example, the Qatar Science and Technology Park (QSTP) provides a range of services to startups at every growth phase (Figure 24). In fact, 90% of technologies coming to QSTP are ICT-related; as a result, their incubation center works intensively with ICT and digital solutions.

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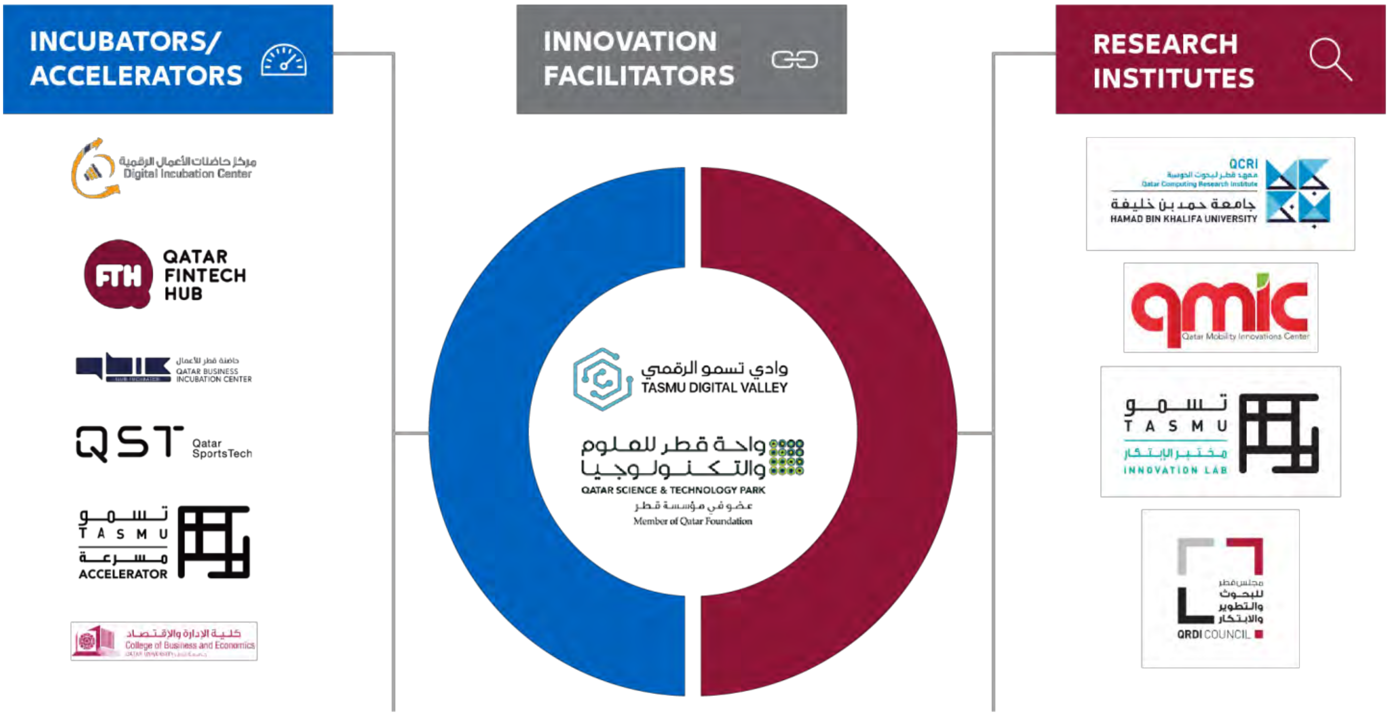
[65] Startup Genome, Global Startup Ecosystem Report 2022, https://startupgenome.com/reports/gser2022

[66] Regional defined as Arab countries

Figure 23. Qatar's Key Innovation Players


INCUBATORS/ ACCELERATORS
INNOVATION FACILITATORS
RESEARCH INSTITUTES
مركز حاضنات الأعمال الرقمية Digital Incubation Center
QATAR FINTECH HUB
حاضنة قطر للأعمال QATAR BUSINESS INCUBATION CENTER
QST Qatar SportsTech
تسمو TASMU مسرعة ACCELERATOR
كلية الإدارة والاقتصاد College of Business and Economics
وادي تسمو الرقمي TASMU DIGITAL VALLEY
واحة قطر للعلوم والتكنولوجيا QATAR SCIENCE & TECHNOLOGY PARK عضو في مؤسسة قطر Member of Qatar Foundation
QCRI معهد قطر لبحوث الحوسبة Qatar Computing Research Institute جامعة حمد بن خليفة HAMAD BIN KHALIFA UNIVERSITY
qmic Qatar Mobility Innovations Center
تسمو TASMU مختبر الابتكار INNOVATION LAB
مجلس قطر للبحوث والتطوير والابتكار QRDI COUNCIL

Source: CRA ICT Sector Survey 2022 (non-exhaustive)

The institutional setup and initiatives highlight Qatar's growing emphasis on innovation and localization of the value chain, although the country's research, development and innovation spend by GDP is historically low compared to regional and global leaders. Moving forward, the government of Qatar will have to engage on multiple fronts to boost the effectiveness of innovation platforms, including enhancing stakeholder collaborations, further involve the private sector, facilitate exports and help innovators access required skills (more detail on this can be found in the "R&D and Innovation" chapter).

Figure 24. Qatar Science & Technology Park Initiatives

**Commerzialization from R&D to Startup**

Connects entrepreneurs with local research institutes to support commercialization of intellectual property

Participants can secure an IP license from QF and are given access to seed investment opportunities

**Incubator**

Focuses on helping entreprenurs establish and grow a startup

Participants can secure an IP license from QF and are given access to seed investment opportunities

**Accelerator (XLR8)**

Supports entrepreneurs to make sure ideas are commercializable

Interdisciplinary team supports participants in creating a business model and go-to-market strategy

**Growth Accelerator (EIV8)**

Help established, local startups grow into international markets

Participants obtain funding, interface with an international accelerator and receive specialized education programming

Source: QSTP

# 4

# The Macroeconomic Context of Qatar

## The Macroeconomic Context of Qatar

Qatar has one of the highest GDPs per capita in the world, thanks largely to its significant crude oil and liquified natural gas reserves. Mining and quarrying, which includes extraction of hydrocarbons, accounts for over a third of the State's nominal GDP (Figure 25). Although the oil and gas sectors continue to form the basis of Qatar's economy, the contribution from other industries is expected to further grow in the coming years. This growth will be driven by the economic diversification efforts promoted by the Qatar National Vision 2030 and the National Development Strategy 2023-2030, and will be further fueled by major international events like the 2023 AFC Asian Cup and the 2030 Asian Games. In their January 2022 Economic Outlook Report, Qatar's Planning and Statistics Authority (PSA) expected virtually no real growth of the hydrocarbon industry due to oil fields reaching peak capacity, global oil and LNG prices, international demand for oil and LNG, and more. However, global events subsequent to PSA's outlook, such as the 2022 Russian invasion of Ukraine, are having and will continue to have an impact on Qatar's GDP, leading to higher expected hydrocarbon and overall GDP growth; indeed, both the World Bank and the IMF forecast Qatar's real GDP to grow 1-3 percentage points more than PSA's January's expectation. This indicates a strong economic outlook for Qatar, as hydrocarbons continue to provide significant value and the non-hydrocarbon portion of the economy continues to diversify and thrive.

Thanks to its strong hydrocarbon sector, Qatar is a net exporter, with mineral fuels, lubricants and related products accounting for 84% of the country's total exports (Figure 26).

Figure 25. Breakdown of Qatar's GDP

| Forecasted Rate of Change | 2022 | 2023 |
|---|---|---|
| Real GDP | ↑ 2.3% | 1.5% |
| Hydrocarbon gross value add to GDP | 0% | 0% |
| Non-hydrocarbon gross value add to GDP | ↑ 3.7% | 2.4% |

| 654bn QAR | 3rd | 93.5k USD |
|---|---|---|
| Nominal 2021 GDP | 2021 GDP/Capita (PPP) Global Rank | 2021 GDP/ Capita (PPP) |

| Top 5 Economic Activities in 2021 | Gross Value Add (QAR mn) | Contribution to GDP (%) |
|---|---|---|
| Mining and quarrying | 241 | 37% |
| Construction | 88 | 14% |
| Financial and insurance activities | 63 | 10% |
| Manufacturing | 57 | 9% |
| Wholesale and retail trade, repair of motor vehicles and motorcycles | 48 | 7% |

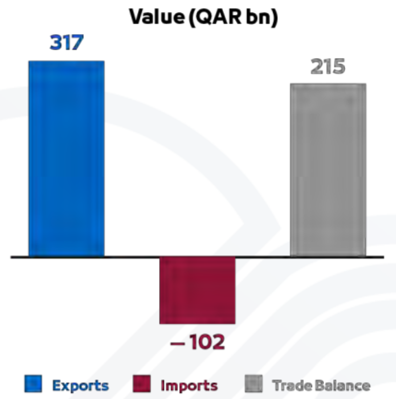
Source: PSA, World Bank[67]

Qatar's population has grown from 1.8 million in 2012 to 2.7 million in 2021[68]. According to Qatar's 2020 Census, the economically active population surpassed two million individuals, with non-Qataris representing approximately 95% of the workforce (Figure 27). Due to expat visa regulations and plentiful economic opportunities for Qataris, the average unemployment rate is a mere 0.1%. Qatari nationals are predominantly employed by the government, with over half working in public administration and defense, while construction accounts for employment of over one-third of non-Qataris (Figure 28).

Figure 26. Qatar's Trade Balance and Top 3 Export/Import Categories

| EXPORT | | IMPORT | |
|---|---|---|---|
| **Mineral Fuels, Lubricants and Related Materials** | 84% | **Machinery and Transport Equipment** | 39% |
| **Chemicals and Related Products** | 9% | **Miscellaneous Manufactured Articles** | 18% |
| **Machinery and Transport Equipment** | 3% | **Manufactured Goods Classified Chiefly by Material** | 15% |

**2021 TRADE BALANCE**



Source: PSA

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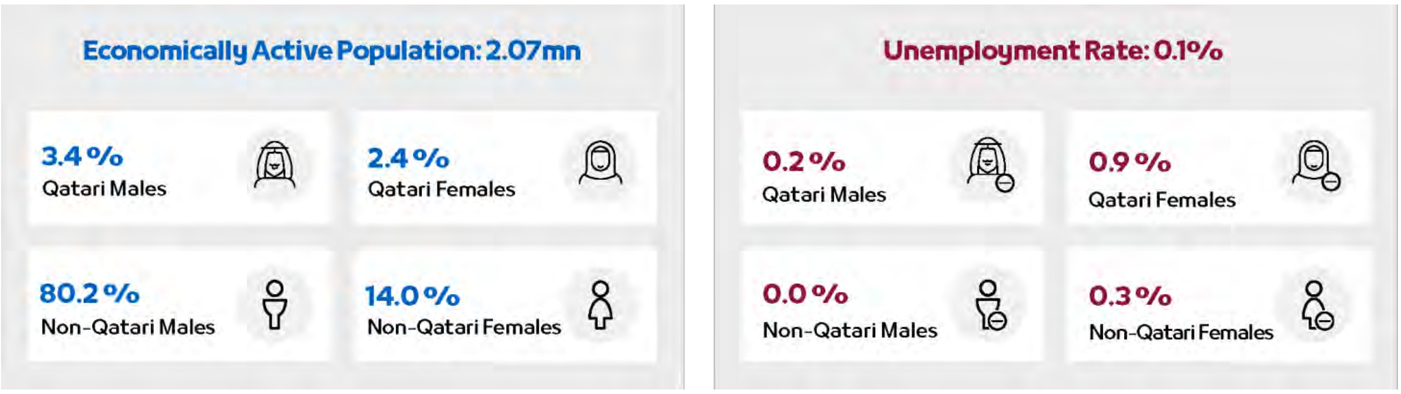
[67] PSA, Window on Economic Statistics of Qatar – 39th issue: Q4 2021; Hydrocarbon GDP refers to the ISIC sector mining and quarrying which includes the extraction of oil and gas; numbers in this report refer to forecasted GDP growth rates published in January 2022, before the start of the Ukraine-Russia war; World Bank data used for GDP per capita in PPP.

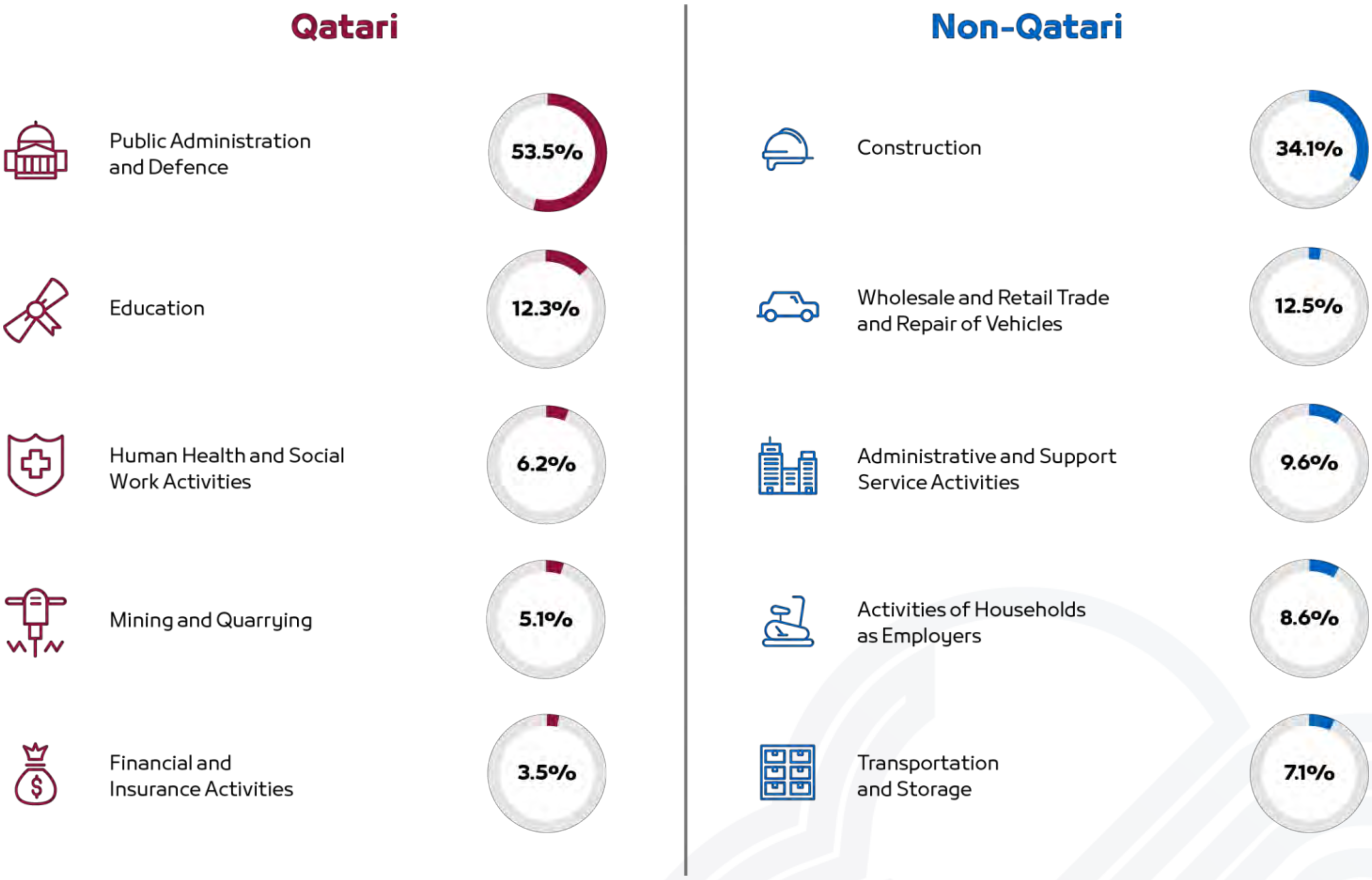
[68] Planning and Statistics Authority website, December 2021 vs. December 2021, https://www.psa.gov.qa/en/statistics1/StatisticsSite/pages/popmobile.aspx

Figure 27. Economically Active Population of Qatar (2020)



Source: PSA Labor Force Sample Survey 2020

Figure 28. Qatar's Workforce Distribution Across Top 5 Sectors (% of total Qatari/non-Qatari workforce)



Source: PSA Labor Force Sample Survey 2020

Economic, social, cultural and environmental development is largely driven by the Qatar National Vision 2030 (QNV 2030) which aims to transform Qatar into an advanced country that can grow sustainably (Figure 29). A significant objective set by the vision is to diversify the economy away from hydrocarbons and to increase focus on the knowledge economy through investments in education and innovation[69]. To achieve QNV 2030, two five-year National Development Strategies (NDS 2011-2016 and NDS 2018-2022) have been developed and executed; these have promoted and directed Qatar's growth in the past years. Development of the third NDS began in May 2022 and will detail the nation's development plan until 2030[70]. In line with the vision, the National Development Strategies (NDSs) recognize the ICT sector as a key enabler of the country's transformation into a knowledge economy, with the sector playing a primary role in facilitating economic diversification efforts and improving e-governance.

**Figure 29. Overview of Qatar National Vision 2030**

**Challenges**

- The size and the quality of the expatriate labor force and the selected path of development
- Managed growth and uncontrolled expansion
- The needs of this generation and the needs of future generations
- Modernization and reservation of traditions
- Economic growth, social development and environmental management

**QNV 2030**

**Transform Qatar into an advanced country by 2030, capable of sustaining its own development and providing a high standard of living for all of its people for generations to come**

**Guiding Principles**

- **Protect Public and Personal Freedoms**
- **Promote Moral and Religious Values and Traditions**
- **Guarantee Security, Stability and Equal Opportunities**

**Strategic Pillars**

**Human Development**

- An educated population
- A physically-and mentally-healthy population
- A capable and motivated workforce

**Social Development**

- Social care and protection
- A sound social structure
- International cooperation

**Economic Development**

- Sound economic management
- Responsible exploitation of oil and gas
- Suitable economic diversification

**Environmental Development**

- A balance between development needs and protecting the environment

Source: Qatar National Vision 2030

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[69] Hukoomi website, https://hukoomi.gov.qa/en/about-qatar/qatar-national-vision-2030#tab-3

[70] Hukoomi news, https://hukoomi.gov.qa/en/news/he-dr-saleh-al-nabit-preparations-of-3rd-national-development-strategy-chaired-by-he-prime-minister-have-begun-officially

# 5

# Qatar's ICT Landscape

# ICT Market

## KEY FINDINGS

**Market performance**

**01**
The information and communication sector contributes 2.7% to Qatar's real non-hydrocarbon GDP, a share that has been increasing; this contribution can further grow to GCC and international levels (4.5% - 6.9%) as the nascent IT segment matures

**02**
Qatar's ICT industry is still focused on the domestic market, with limited exports: only 11% of local IT companies surveyed are currently serving foreign markets

**03**
Qatar's ICT ecosystem includes important structural elements, but must enhance integration

**04**
The industry shares a positive sentiment for the future: more than 70% of ICT businesses believe that Qatar's market is attractive and can be a base for international expansion

**Supply overview**

**05**
The telecommunications segment in Qatar is mature and concentrated around a few players

**06**
Based on the survey, 80% of IT companies in Qatar have less than 50 employees, the majority being local businesses; a vibrant MSMEs ecosystem can contribute to economic and social wellbeing, but common scale-related challenges need to be tackled

**07**
Service provision and distribution remain the main activities of IT companies in Qatar, although ~50% of them are also involved in hardware production or software development

**08**
Most IT companies in Qatar include emerging technologies in their offering, however a significant share (~40%) still focuses on traditional technologies only – especially local businesses

**Demand drivers**

**09**
IT spending in Qatar is expected to grow at a 5.5% CAGR until 2025, a rate higher than the growth of the overall economy; this shall come in return to the government's ambitious commitment to open the market and drive the digital agenda

**10**
Today, half of the ICT companies serve the public sector, which will remain an important demand driver in the future

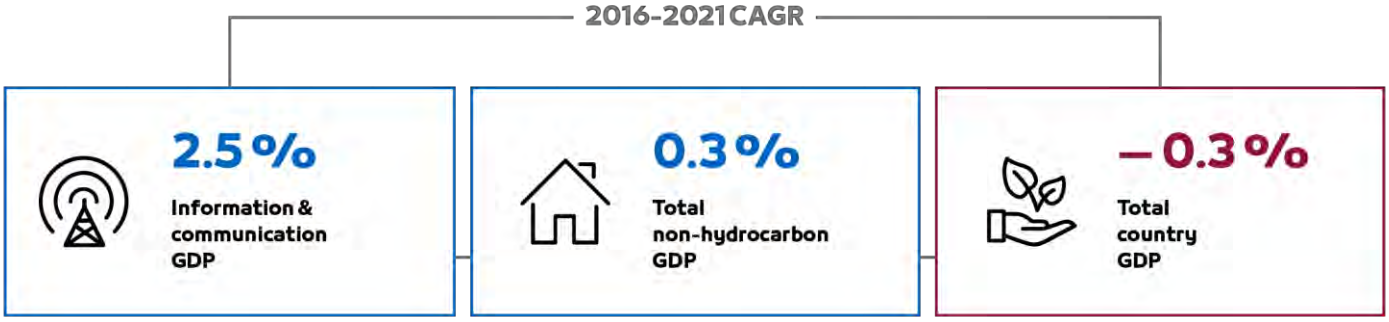
**11**
The private sector has the potential to increase its ICT spending as a result of global digitization trends and local government push (e.g., TASMU), with National Champions presently being and continuing to be key drivers of digitalization efforts

# Market Performance

## 1 – The information and communication sector contributes 2.7% to Qatar's real non-hydrocarbon GDP, a share that has been increasing; this contribution can further grow to GCC and international levels (4.5% - 6.9%) as the nascent IT segment matures

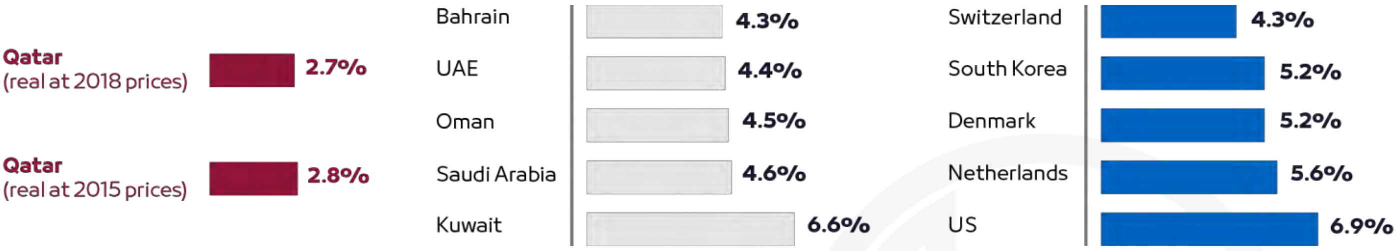
The real GDP generated by the information and communications sector[71] in Qatar has grown since 2016 at an annual average rate[72] of around 2.5%, compared to a growth close to zero of the total non-hydrocarbon sectors (Figure 30)[73].

**Figure 30. Real GDP Growth by Sector, Non-Hydrocarbon (CAGR 2016-2021)**



This led the sector to contribute 2.7% of Qatar's real non-hydrocarbon GDP in 2021. Despite recent growth, however, this share remains smaller than in other GCC states and top ICT economies[74], where the information and communications industry contributed between ~4% and ~7% of the real GDP in 2021 (Figure 31). This indicates that Qatar has room to pursue further sector growth.

**Figure 31. Contribution of the ICT sector to the Real Non-Hydrocarbon GDP in Qatar, GCC and Major Countries (2021)[75]**



Note: For reference, information and communications contributed 1.8% of the nominal GDP in Qatar in 2020 and 1.6% in 2021 respectively. For more relevant sector assessment and cross-country comparability real non-hydrocarbon GDP is considered as a base measure here (i.e., GDP net of "mining and quarrying")

Source: PSA (real GDP at 2018 prices); Oxford Economics (Qatar and other countries' real GDP at 2015 prices)

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[71] Please refer to footnote in previous chapters and to the Appendix for further explanation

[72] Compound Annual Growth Rate (CAGR)

[73] Generally, hydrocarbon GDP refers to the value added of extraction of oil and gas activities - NACE rev2 division 06/ISIC Rev. 4 0610 & 0620. Given the granularity of available official data, hydrocarbon GDP is here approximated by the GDP generated by the "mining and quarrying" sector (Section B ISIC rev. 4). Therefore, non-hydrocarbon GDP is the total GDP minus "mining and quarrying"

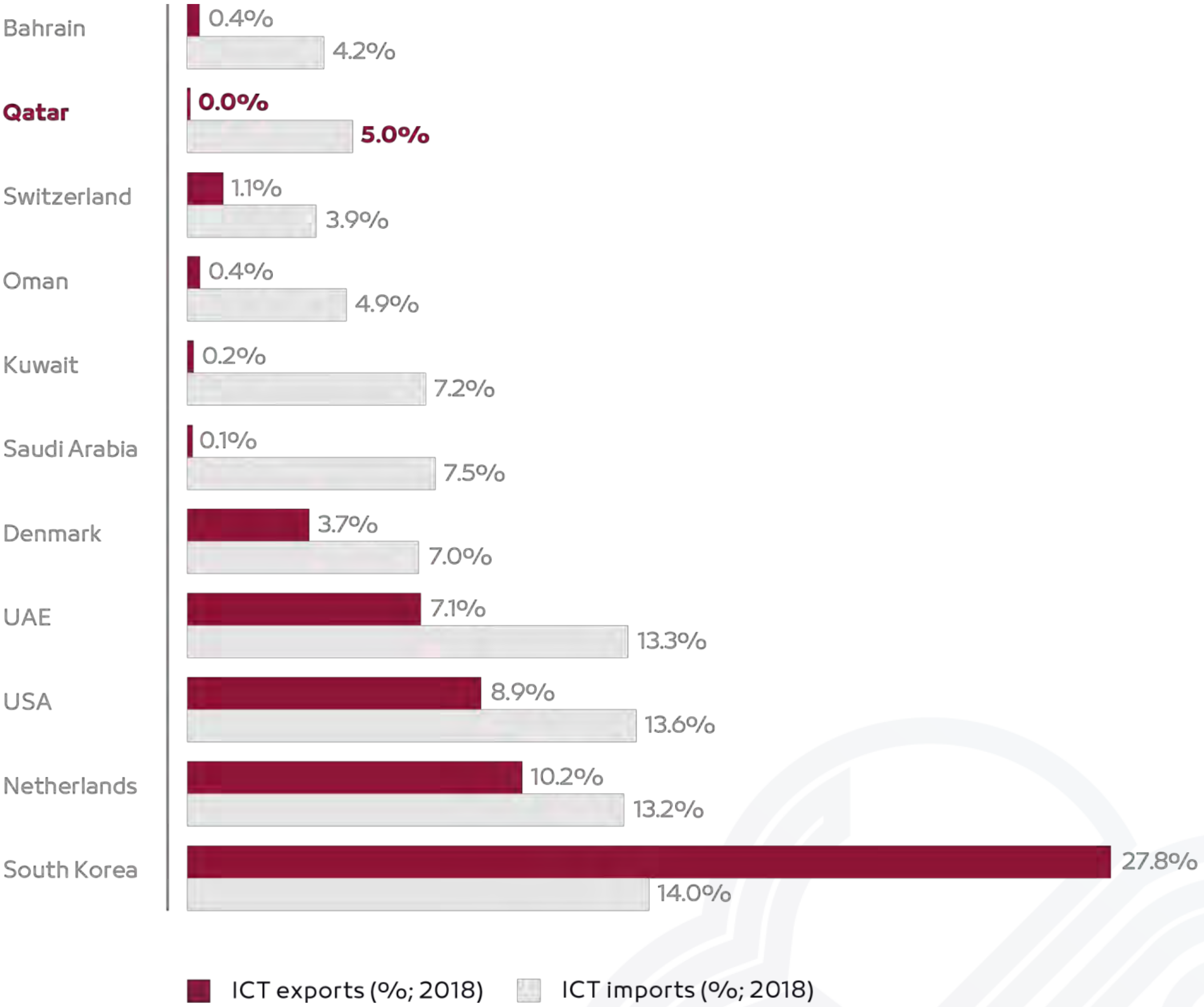
[74] Switzerland, South Korea, Denmark, Netherlands (among the Top-10 list of the UN ICT Development Index (2019), USA (largest ICT economy).

[75] Total real GDP for South Korea, Netherlands, Denmark, US, Switzerland; non-hydrocarbon real GDP for Qatar, Saudi Arabia, Oman, Kuwait, UAE Bahrain; Source: World Bank, OECD

In particular, there is significant potential for growth of the IT segment, with most of the ICT GDP impact today driven by the telecommunications segment, while the IT segment is still nascent. In 2020, the CRA estimated that the IT segment represented less than 20% of the whole ICT industry which sharply contrasts with mature markets such as the EU, the US and Singapore, where the IT segment represents the majority of the sector.

## 2 – Qatar's ICT industry is still focused on the domestic market, with limited exports: only 11% of local[76] IT companies surveyed are currently serving foreign markets

Figure 32. Value of ICT Exports and Imports as a Percentage of Total Exports and Imports (2018)



Source: The World Bank Database, PSA Qatar

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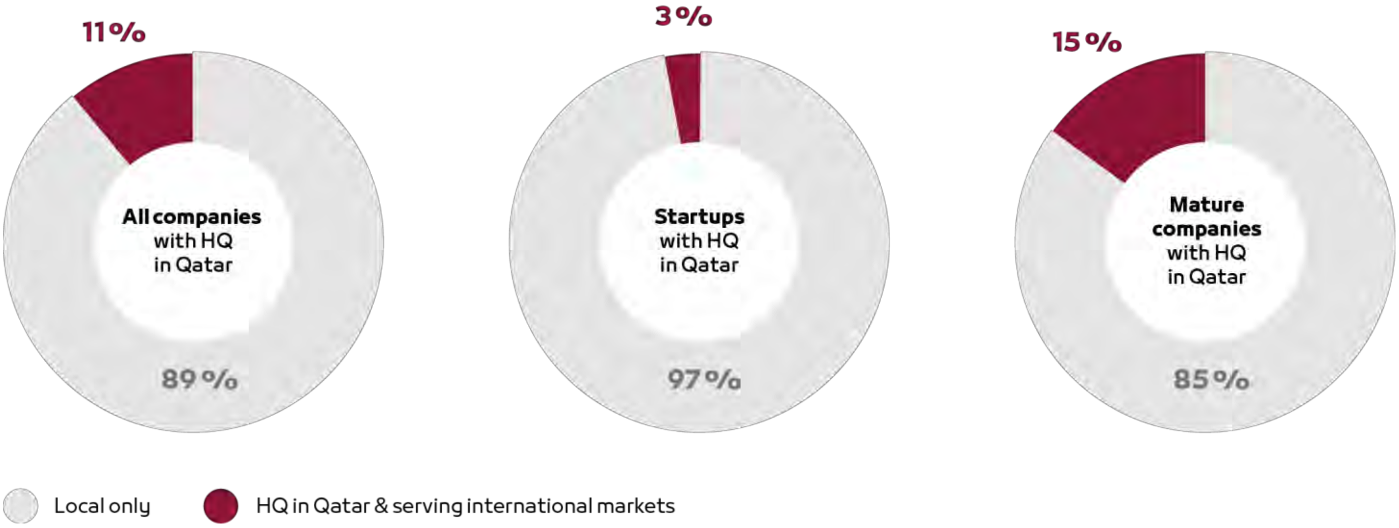
[76] i.e., companies with headquarter in Qatar

Similarly to most GCC countries, Qatar's ICT industry mainly serves the domestic market and exhibits virtually no exports (Figure 32) beyond the international operations of some national champions like Ooredoo and Es'hailSat, and of exceptional startups such as Snoonu, which entered Oman in May 2022[77]. The CRA ICT Sector Survey 2022 shows that only 11% of IT businesses headquartered in Qatar serve foreign markets. Although the phenomenon is true for companies at different maturity levels, startups typically encounter higher barriers to export (Figure 33), and multiple stakeholders interviewed highlighted the need to help young companies grow in Qatar as well as abroad (see the *R&D and Innovation* section for more details).

**Figure 33. Companies with Headquarters in Qatar by Geographical Coverage (% of respondents)**



n = 355
Source: CRA ICT Sector Survey 2022

So far in the GCC, the UAE has grown into an important export-oriented ICT hub, with the ICT sector representing 7% of the Emirates' exports in 2018, and has continued to consolidate its position in R&D, cloud services, cybersecurity and artificial intelligence. Both Qatar and Saudi Arabia aspire to grow their knowledge economies and have substantial prospects to emerge as new regional digital hubs.

Qatar imports a fair share of ICT goods and services: the sector constitutes ~5% of total imports. The government can explore localization opportunities for high value-added ICT solutions, for example with ensuring supporting local content and local SMEs in public and semi-public procurement. Indeed, as further discussed below, multiple ICT companies interviewed by the CRA lament difficulties for Qatari businesses to win public tenders, and their inability to compete with more established solution providers. Given the nascent nature of the IT segment, localization and export facilitation efforts will have to be complemented by initiatives to enhance the competitiveness and preparedness of local businesses.

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[77] Exports as defined by the Balance of Payments, i.e., does not include exports through commercial presence abroad (Mode of Supply 3 as defined by the WTO). Qatar exports telecommunications services through Ooredoo having presence abroad.

## 3 – Qatar's ICT ecosystem includes important structural elements, but must enhance integration

Survey stakeholder interviews uncovered a general appreciation within the industry for the government's effort to support the establishment of key structural elements of the ecosystem, including strong infrastructure, relevant university programs and training courses, research institutions, accelerators and centers of excellence, enhanced policies and regulations, and the attraction of large international players such as Microsoft and Google to Qatar.

Stakeholders also highlighted how the demand for market-leading IT solutions by public and semi-public entities have contributed to building the ecosystem and enabling further digitalization in the country; examples of such digital initiatives include government-led programs like the Qatar Smart Program (TASMU), Qatar Digital Government, Qatar Customs Clearance Single Window (QCCSW) and MOCI[78] Single Window platform, smart city projects like Msheireb Downtown Doha and Lusail, the Hamad International Airport smart airport program, Tawteen platform by Qatar Energy, and others.

These existing structural elements are core enablers to jumpstart a competitive ICT sector in Qatar.

> **The good thing about Qatar is that the government is investing effort for the country; for example bringing large players such as Microsoft and Google. I think that if the ecosystem of Qatar has at least two or three major cloud players, that is going to help a lot when it comes to being a more open market.**
>
> **— Global hardware company**

Despite being endowed with important structural elements, the ICT ecosystem in Qatar remains fragmented with existing components having yet to reach full integration and interoperability. Interviewed stakeholders highlighted how, for example, government entities and national champions tend to procure IT solutions from international suppliers although local alternatives are available. R&D and innovation efforts are not fully leveraged and developed into viable businesses, and collaboration and knowledge transfer between larger, international companies and smaller local ones should be further enhanced. Stakeholders share the opinion that the government of Qatar should develop a holistic vision for the ICT sector, issue regulations and undertake initiatives that enable organic and cohesive growth by encouraging collaboration and interconnection of different players.

---

[78] Ministry of Commerce and Industry

> Currently, Qatar's IT sector is developing and seeking recovery from the COVID-19 pandemic... The ecosystem needs to be improved – participants have been implementing solutions and technologies, but there is still limited interoperability. The market needs to mature in this sense.

— **Qatari government entity**

> Currently, the ICT ecosystem in Qatar is not fully functioning as the many and important existing components do not work together effectively. We have startups, we have QBIC, we have research institutes, we have end users, we have initiatives, but all these elements are disconnected.

— **ICT investor**

### 4 – The industry shares a positive sentiment for the future: more than 70% of ICT businesses believe that Qatar's market is attractive and can be a base for international expansion

Most ICT companies surveyed perceive Qatar's ICT sector as attractive: 75% of them agree with the statement that Qatar is an attractive market for ICT businesses today. Furthermore, the majority believe that the ICT market in Qatar is growing faster than in other GCC states and that the country is an attractive base from which to pursue international expansion (Figure 34). This is true for both companies that are only locally present[79] and for those that also have international exposure[80]. Therefore, the survey suggests that Qatar has the potential to become a hub for business that serve both the local and foreign markets.

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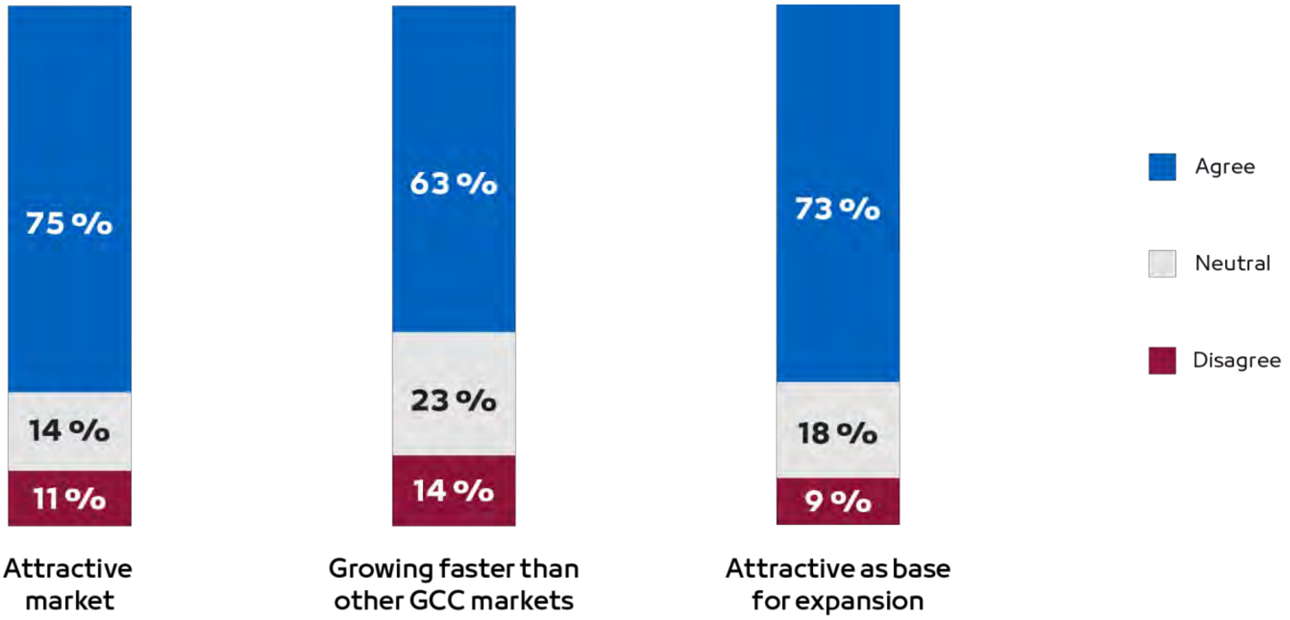
[79] Companies with headquarters in Qatar and serving the local market only

[80] Companies with headquarters in Qatar or abroad that, besides Qatar, serve other markets

Figure 34. ICT Companies' Perception of the ICT Sector's Attractiveness in Qatar (% of respondents)



n = 362
Source: CRA ICT Sector Survey, 2022

## Supply overview

### 5 – The telecommunications segment in Qatar is mature and concentrated around a few players

Due to the small size of the country, the telecommunications segment in Qatar has historically been concentrated[81] around a handful of players. Three providers operate in the fixed telecommunication networks and services segment: Ooredoo, Vodafone and QNBN. Ooredoo and Vodafone cover the retail market with the provision of both fixed and mobile networks and services, while QNBN is primarily a wholesale provider of passive fixed connectivity. Four satellite operators are licensed to provide satellite TV and VSAT services. In September 2022, the CRA further licensed Starlink Satellite Qatar, established in Qatar by the leading international company SpaceX. The license allows provision of satellite broadband Internet services to individuals and businesses in Qatar via the Low-Earth Orbit (LEO) satellite constellation of SpaceX.

Qatar's telecommunications market is characterized with high fixed and mobile broadband penetration rates (Figure 35), providing service providers with healthy revenue metrics (Figure 36). The segment in Qatar is projected to grow at a 6% CAGR[82] until 2026, generally in line with the global growth rate[83].

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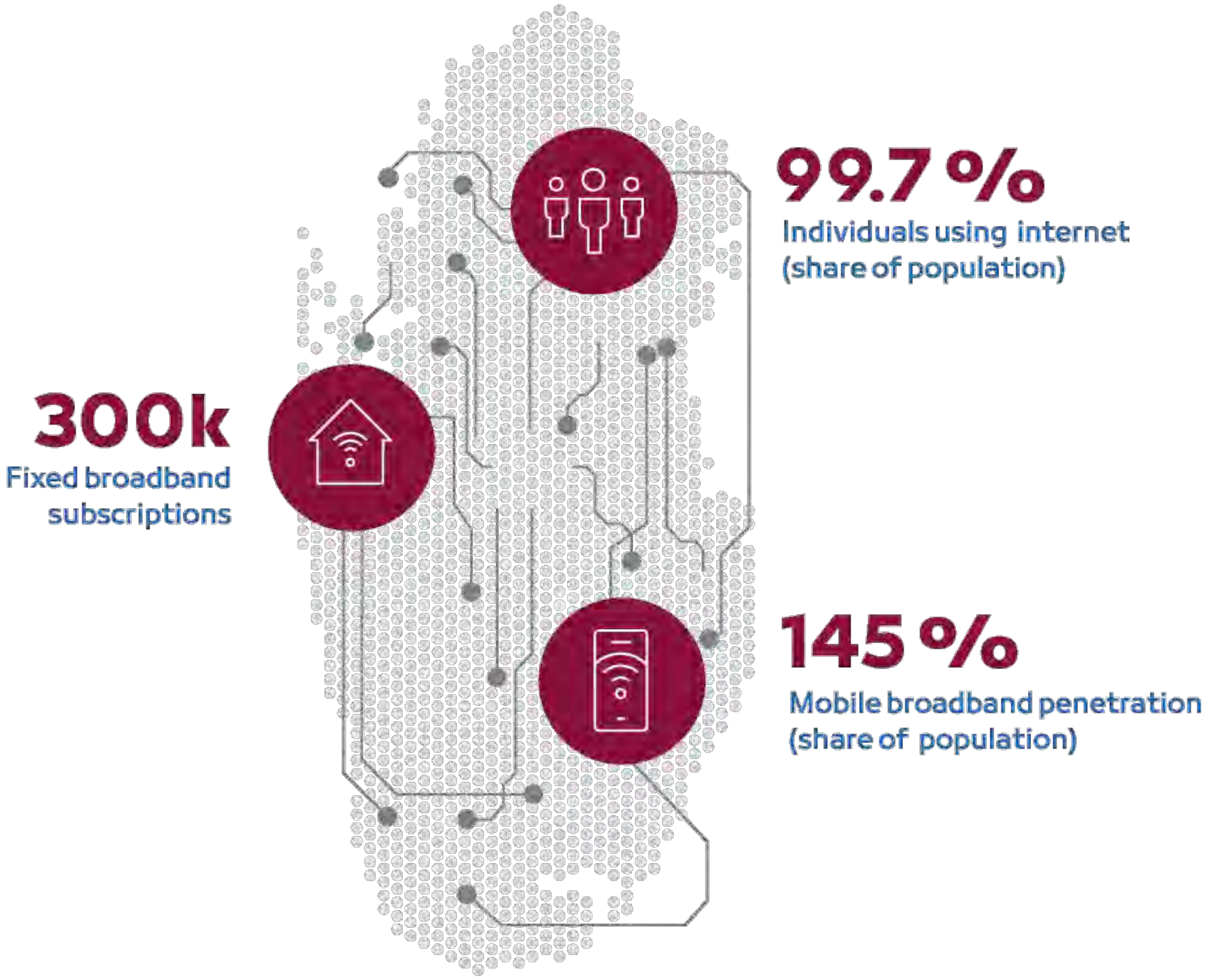
[81] Qatar Telecommunication Market Report (2020-2025), Global Monitor

[82] Qatar Telecom Operators Country Intelligence Report, 2021, GlobalData

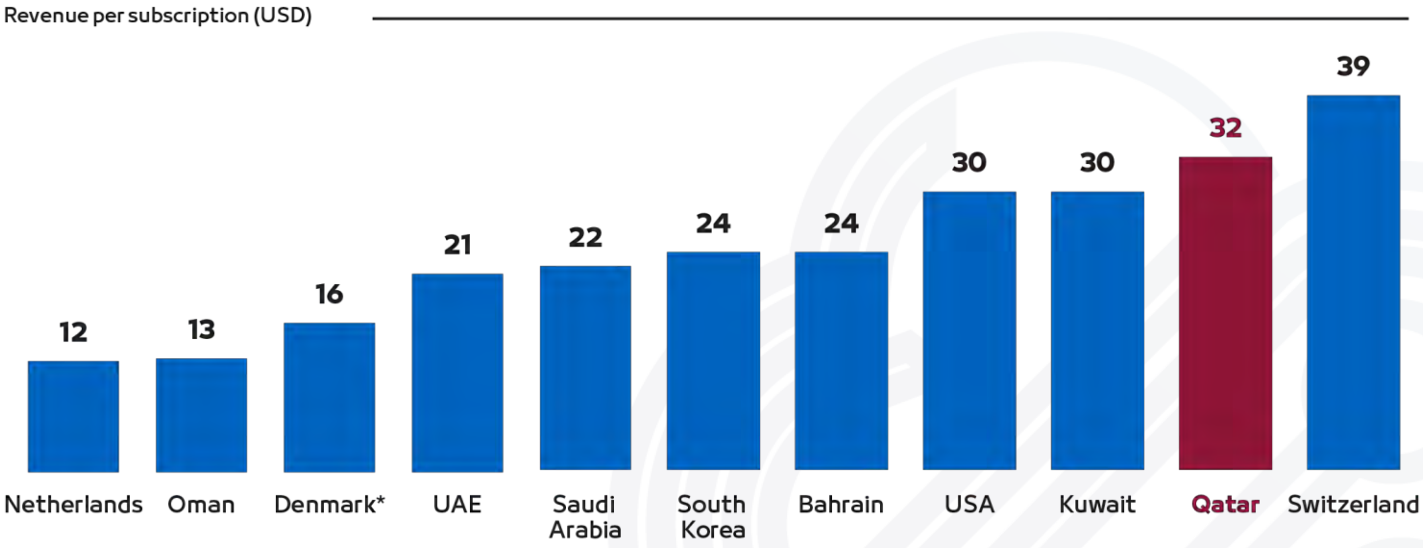
[83] Global Telecom Services Market Size Report, 2021-2028, Global View Research

Figure 35. Key Internet Penetration Metrics in Qatar


99.7 %
Individuals using internet (share of population)
300k
Fixed broadband subscriptions
145 %
Mobile broadband penetration (share of population)

Sources: CRA elaboration on Service Providers, PSA and ITU data

Figure 36. Average Revenues per Mobile Subscription (USD) by Market, 2021

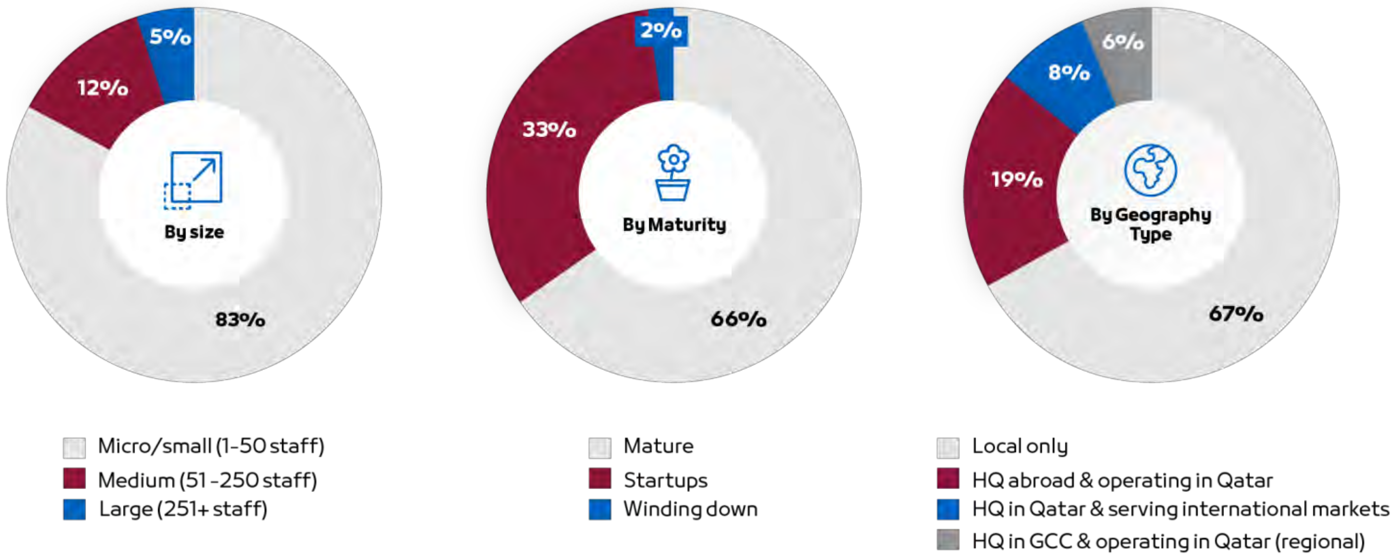


Source: Omdia, Informa Tech, S&P Capital IQ industry reports

## 6 – Based on the survey, 80% of IT companies in Qatar have less than 50 employees, the majority being local businesses; a vibrant MSMEs ecosystem can contribute to economic and social wellbeing, but common scale-related challenges need to be tackled

A large share of companies operates in the IT segment in Qatar. Based on the sample of the CRA ICT Sector Survey 2022, around 80% of these companies are micro or small, and only 5% qualify as large. Most of the IT companies operating in Qatar are local only and approximately one third are young companies. (Figure 37).

**Figure 37. Distribution of IT Companies in Qatar by Size, Maturity, and Geography Type (% of respondents)**



n = 355
Source: CRA ICT Sector Survey 2022

A fragmented IT sector with a large share of SMEs[84] is a common market pattern globally. A vibrant MSMEs ecosystem can be an important driver of economic growth and diversification: MSMEs not only generate direct GDP impact and employment, but they can also considerably contribute to talent development and innovation across multiple sectors of the economy thanks to their often more flexible business models and drive to succeed. However, MSMEs' contribution to the economy should be supported and sustained through tackling common challenges that smaller companies typically face and that can negatively impact their competitiveness and ability to scale. For example, better access to global markets and market intelligence are essential to boost MSMEs' contribution, but trade and investment barriers often hinder their ability to internationalize. Furthermore, bureaucracy and inefficiency of public administration tend to fall disproportionally on smaller businesses and startups. Access to strategic resources such as finance, talent and public procurement opportunities are other elements that can sustain MSMEs' competitiveness, thus illustrating their ability to contribute to the economy. This means that MSMEs require cross-cutting and bespoke support to thrive, become self-sustaining and resilient, and grow locally and internationally[85, 86].

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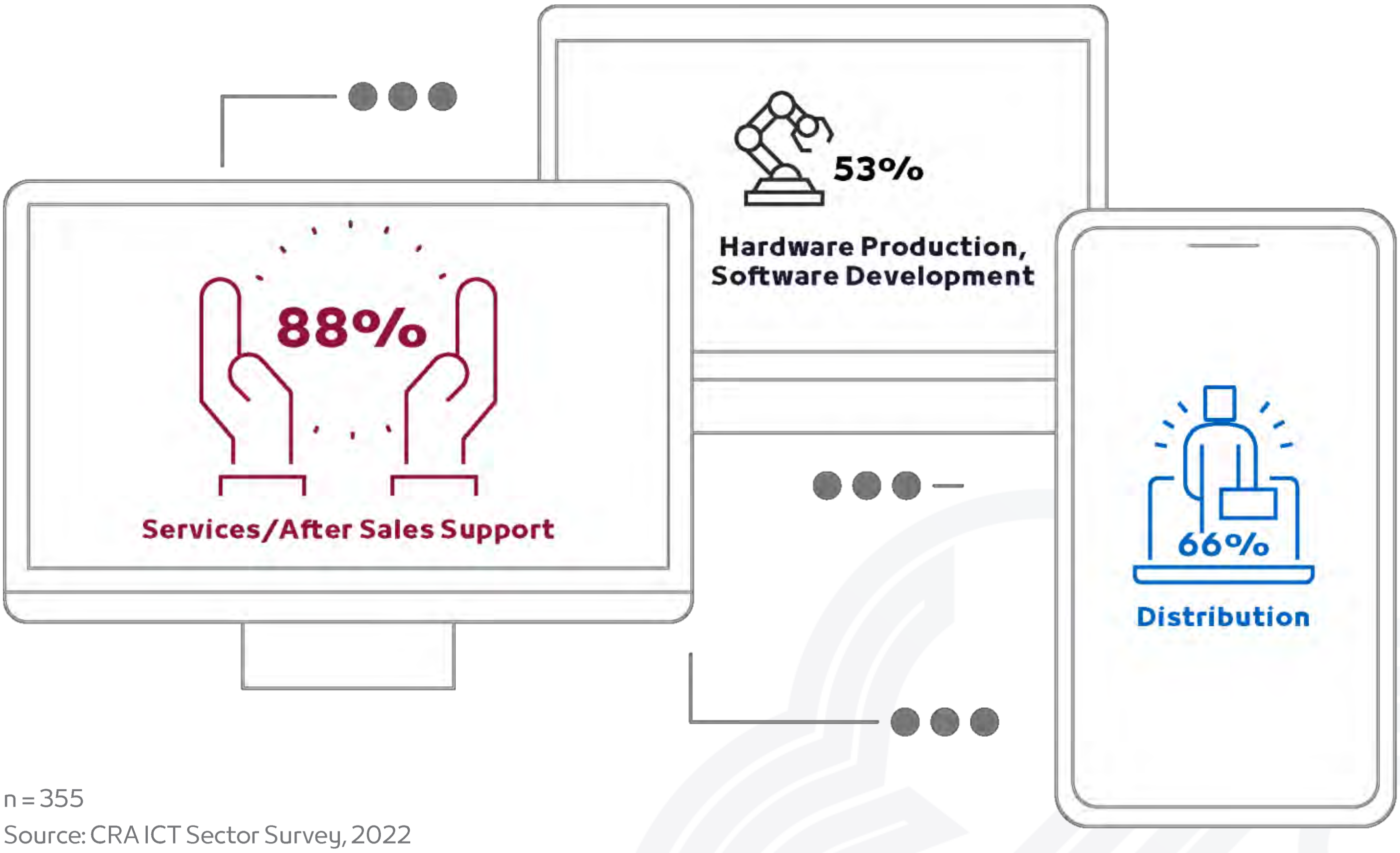
[84] Micro, Small and Medium Enterprises

As highlighted throughout the report, the CRA ICT Sector Survey 2022 has confirmed that startups and SMEs still face challenges in Qatar ranging from limitations and issues around participation in and for public tenders, sub-par access to finance, and talent availability. Further sector development will require tackling these challenges through the implementation of government regulations and buy-in from market players.

## 7 – Service provision and distribution remain the main activities of IT companies in Qatar, although ~50% of them are also involved in hardware production or software development

Based on the findings of the CRA ICT Sector Survey 2022, most IT companies in Qatar are currently active at several stages of the value chain, however, services/after sales support and distribution remain the most common areas of business (Figure 38).

**Figure 38. Activities of IT Companies by Value Chain Business[87] (% of respondents)**



n = 355
Source: CRA ICT Sector Survey, 2022

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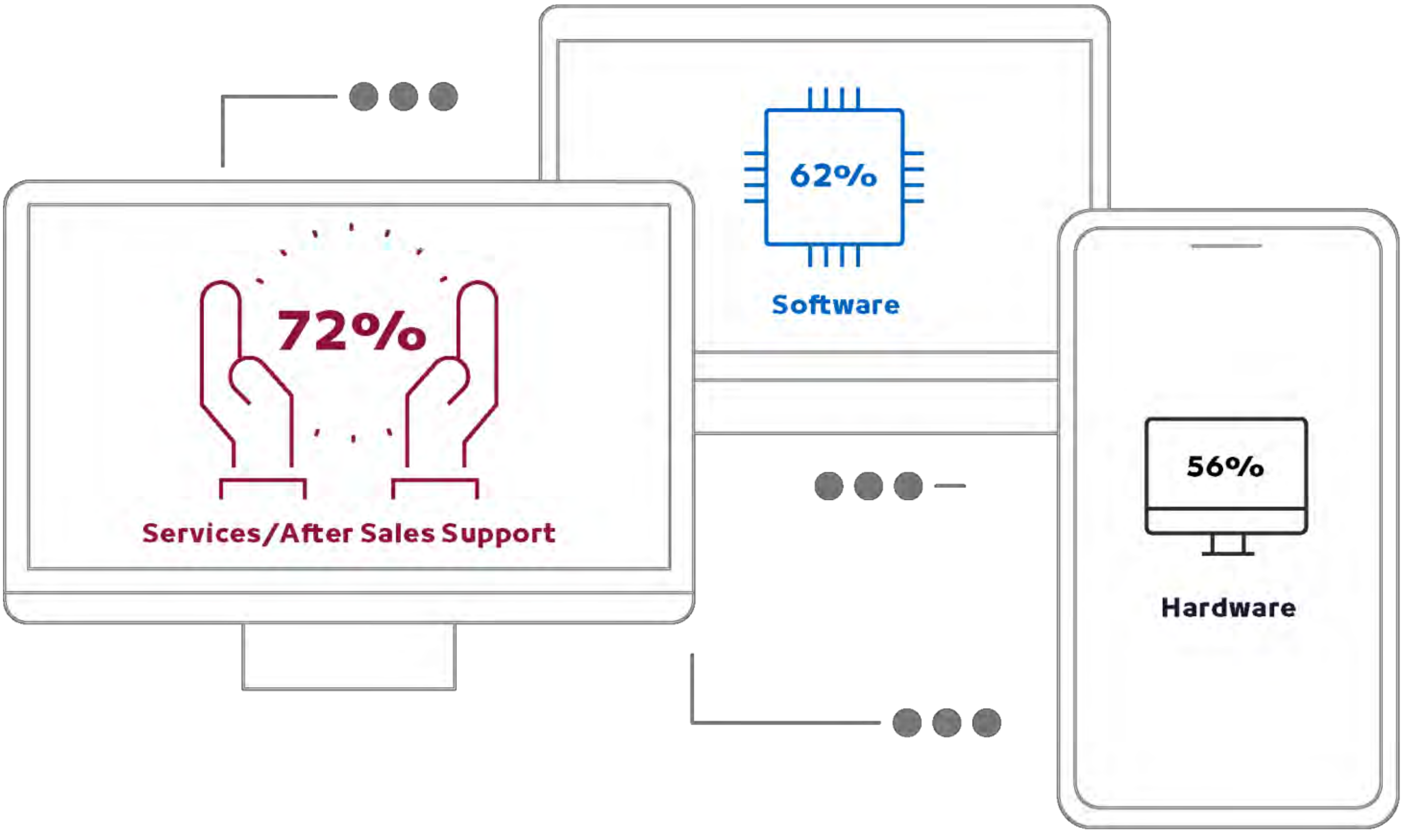
[85] HBR, A Small Business Is Not a Little Big Business, 1981; , https://hbr.org/1981/07/a-small-business-is-not-a-little-big-business

[86] OECD, *Enhancing the contributions of SMEs in a global and digitalized economy*, 2017, https://www.oecd.org/industry/C-MIN-2017-8-EN.pdf

[87] Refer to the Appendix for further clarifications on the definition

More than 80% of IT companies include more than one product category (services, software, and hardware) in their portfolio. Services is the most common, while a promising 62% of surveyed entities are active in the software segment (development or deployment) and 56% in hardware (Figure 39).

Figure 39. Business Activities of IT Companies by Product Type (% of responses)



n = 355
Source: CRA ICT Sector survey, 2022

## 8 – Most IT companies in Qatar include emerging technologies in their offering, however a significant share (~40%) still focuses on traditional technologies only – especially local businesses

The CRA ICT Sector Survey 2022 shows that more than half of IT companies in Qatar have introduced emerging technologies (ET) in their offering. However, a significant share of ~40% of these businesses still focus solely on traditional technologies (TT)[88]. Local companies in particular seem to be more resistant to including ET in their portfolio, with almost half of them basing their products and services on traditional technology only compared to just one-fourth of international companies. Traditional technology remains important for those that have embraced ETs as well: only 4% of surveyed companies focus on ET exclusively (Figure 40).

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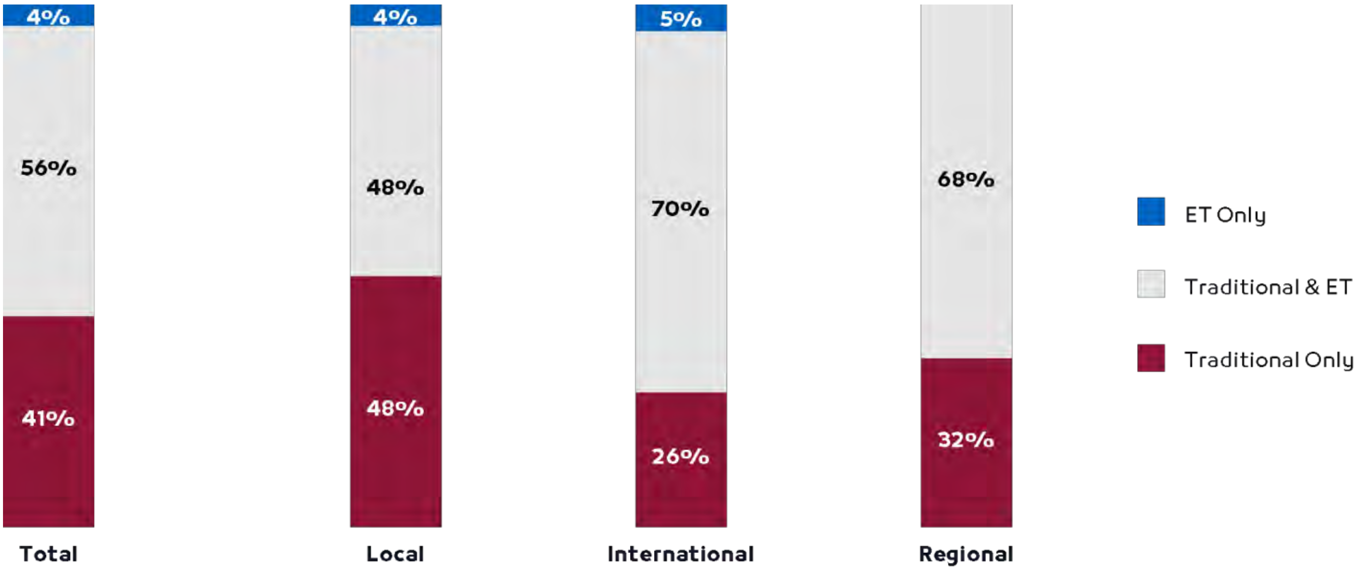
[88] Refer to the ICT Classification and Appendix for further clarifications on the definitions

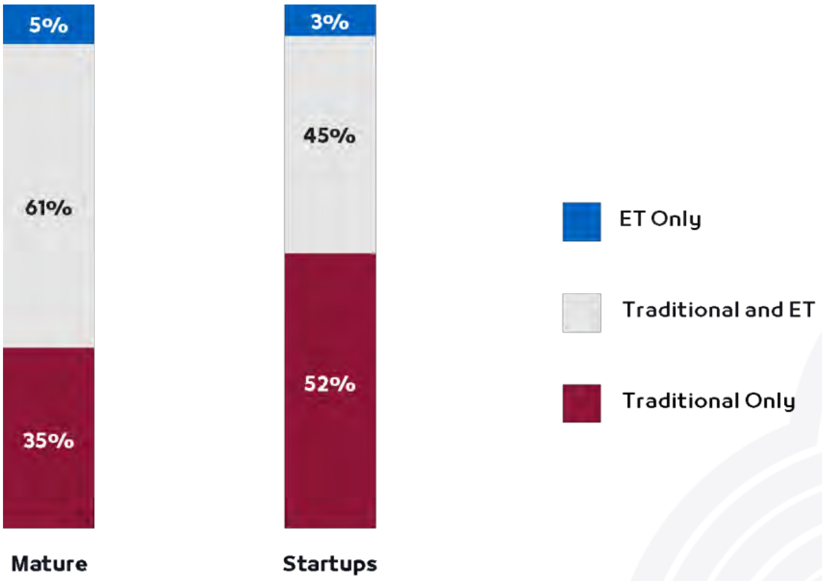
Figure 40. Adoption of ET Across Companies by Geographical Type (% of responses)



n = 355
Source: CRA ICT Sector Survey, 2022

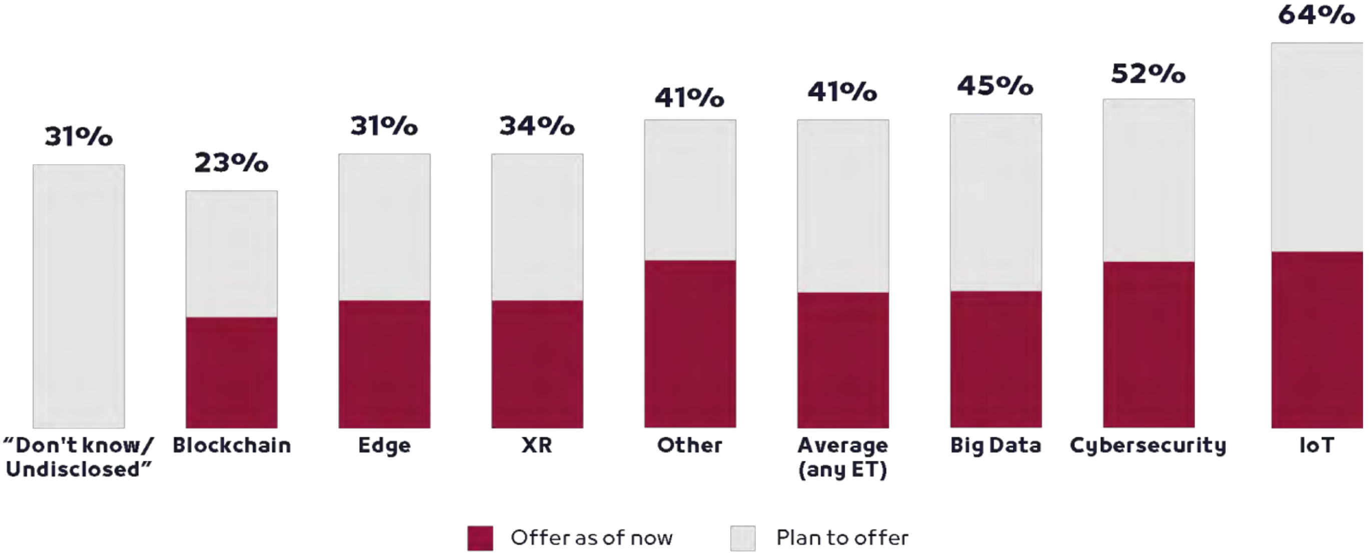
Mature companies in Qatar are more likely to adopt emerging technology than startups. Half of the surveyed startups declared that they only focus on traditional technologies (Figure 41). Some possible reasons for limited adoption of ETs by startup companies are explored in the R&D and Innovations section of this report and may be related to the buyers' preference for well-established companies when procuring innovative technologies.

Figure 41. Adoption of ET by Company Maturity Status (% of responses)



n = 355
Source: CRA ICT Sector Survey, 2022

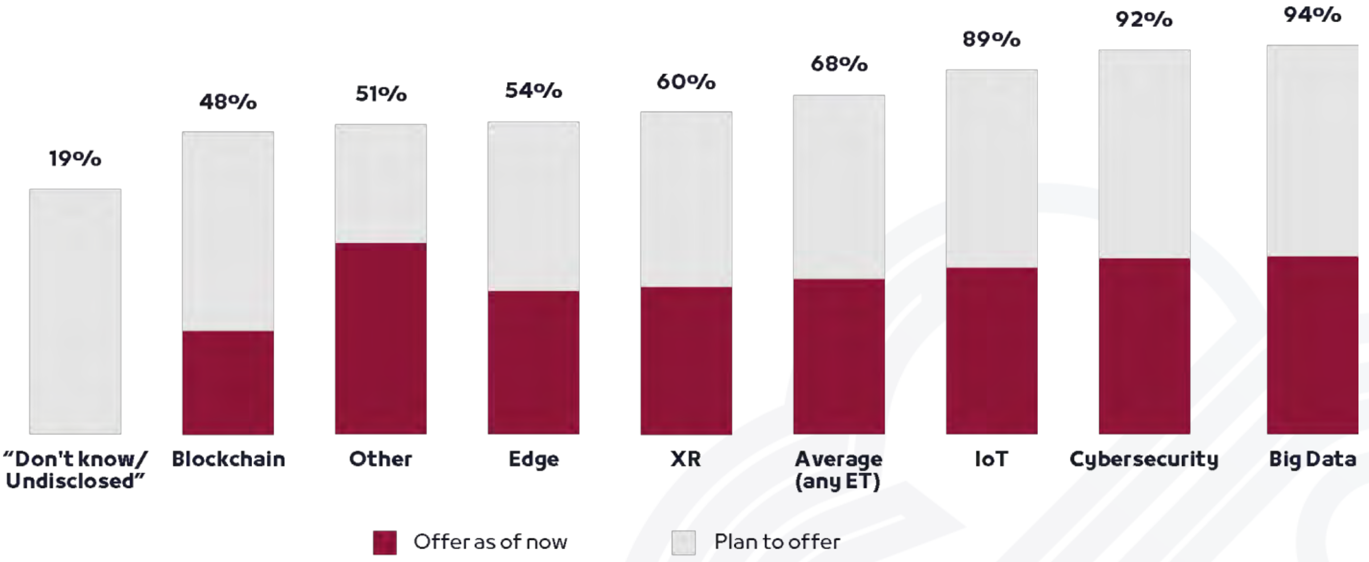
Figure 42. ETs by IT Companies in Qatar (All Geographical Types)
(% of respondents that offer or plan to offer ET)



n = 248
Source: CRA ICT Sector Survey, 2022

IoT, cybersecurity and big data are the top 3 categories of ET offered. Companies with international exposure (i.e., not local-only) are more likely to offer a broader ET portfolio, with about 50% of them already including or planning to include blockchain, edge computing and XR (Figures 42 and 43).

Figure 43. ETs by IT Companies in Qatar (Companies with International Presence)
(% of respondents that offer or plan to offer ET)



n = 114
Source: CRA ICT Sector Survey, 2022

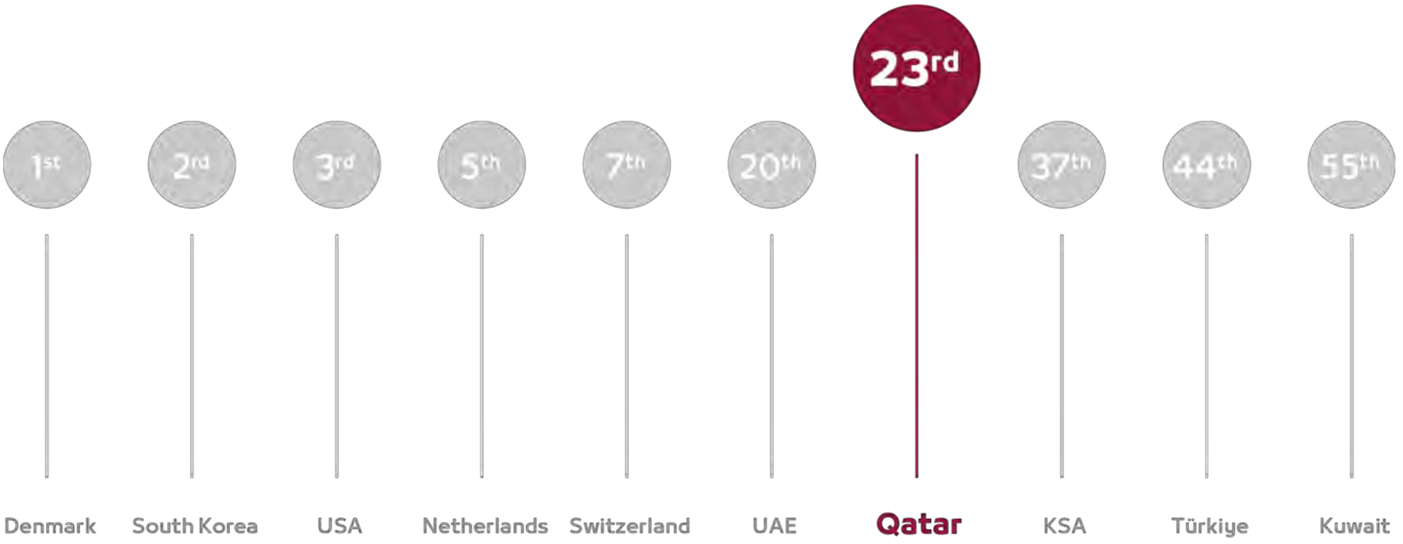
# Demand Drivers

## 9 – IT spending in Qatar is expected to grow at a 5.5% CAGR until 2025, a rate higher than the growth of the overall economy; this shall come in return to the government's ambitious commitment to open the market and drive the digital agenda

Digital adoption in Qatar is set to grow, driving the growth of the ICT sector. The State is consistently ranked ahead of most regional peers in the Future Readiness pillar of the IMD Digital Competitiveness Index (Figure 44). The index measures the capacity and readiness of 63 economies to adopt digital technologies as key drivers of economic transformation.

The Future Readiness pillar assesses a country's performance in terms of key elements enabling future adoption: adaptive attitudes (e.g., e-participation, smartphone penetration), business agility (e.g., knowledge transfer, use of big data and analytics) and IT integration (e-government, cybersecurity).

**Figure 44. Future Readiness Factor Rankings (DCI, 2021)**



Source: The IMD World Digital Competitiveness Reports 2017-2021

Fitch Solutions expects Qatar's IT market[89] to grow at a 5.5% CAGR in the period between 2021 and 2025 (Figure 45)[90]. This rate is higher than the estimated overall real GDP growth the highest projections from the IMF and the World Bank forecast an average growth rate between 3% and 4.5%. As discussed below, growth of the IT market can be driven by both government initiatives and digitalization plans, and by increased adoption in the private sector.

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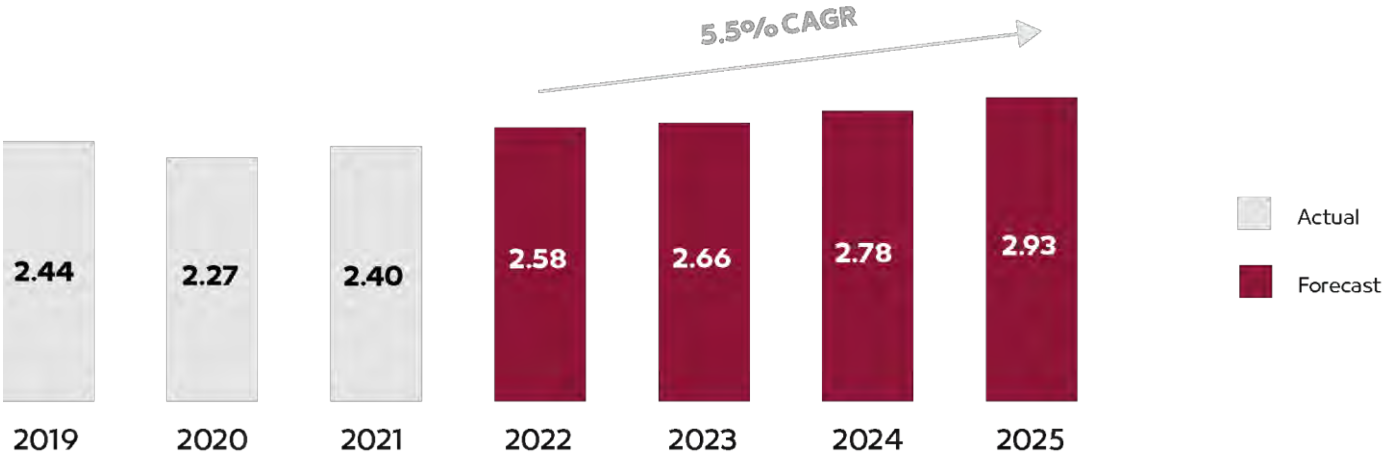
[89] i.e., the spending on IT solutions

[90] Fitch Solutions IT industry forecast are generated using best-practice techniques of time-series modelling and casual econometric modelling; further details can be found in the *Information Technology Report Q1 2022* by Fitch Solutions

Figure 45. Qatar IT Market Value (USD bn)

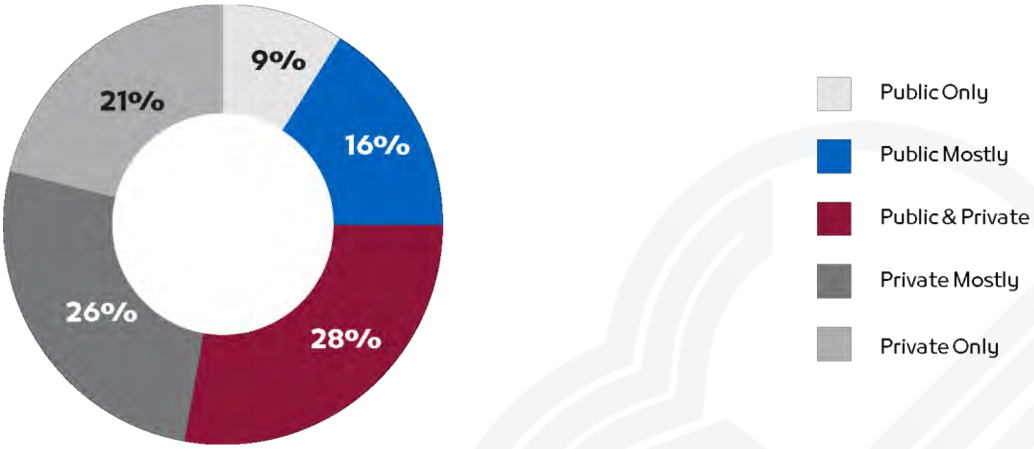


Source: Fitch Solutions Information Technology Report, Q1 2022

## 10 – Today, half of the ICT companies serve the public sector, which will remain an important demand driver in the future

More than half of ICT companies in Qatar consider the government an important source of revenue, with 25% of the companies surveyed working only or mostly with the public sector (Figure 46). Worldwide, on average, only 13% of ICT spending comes from government sources[91]. Similarly to other industries in Qatar, the ICT sector benefits considerably by the digitization role played and promoted by the government. In particular, among the companies surveyed, multinationals[92] are more likely to do some business with the government of Qatar, i.e., 63% versus ~50% of local entities. Spending on digitalization is one of the channels that the government can leverage to sustain the domestic ICT industry and attract foreign players.

Figure 46. ICT Companies by Source of Revenue (% of respondents)



Source: CRA ICT Sector Survey, 2022

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[91] Gartner Forecasts total worldwide IT spending to Reach $4.4 Trillion in 2022; and Government IT spending to grow 5% in 2022

[92] Companies having headquarter abroad, but also operating in Qatar

Stakeholders interviewed confirmed the important role played by the government as an ICT demand driver.

> **Most of the ICT spending comes from the government; even big tech companies like Google and Microsoft are mainly here for the government and are still doing limited work with small businesses.**
>
> **— Qatari ICT investor**

> **The government controls a large portion of the economy, and it is still the main client for larger international companies, who came to work with the public sector. This will continue in the future because even if the government withdraws from some sectors, it will still be the de-facto ultimate owner.**
>
> **— Qatari business accelerator**

ICT stakeholders expect the public sector to continue being an important source of revenue for the industry in the future. Spending in ICT will be driven by the country's development objectives and the rich pipeline of digitalization initiatives. The government is committed to boosting investments and spending on ICT solutions, including to continue building on Qatar's "e-Government 2020 Strategy", especially given how past spending in e-Government has helped Qatar increase its e-government development index. score[93]. However, additional investments and targeted actions will be needed to keep the pace of technology evolution and close the gap with better-performing countries after having lost more than twenty-five positions in the global ranking in the past few years (Figure 47). Furthermore, the government will continue to push the implementation of the Cloud First policy for public procurement of cloud services, consistently with the principles of the Cloud Policy Framework[94].

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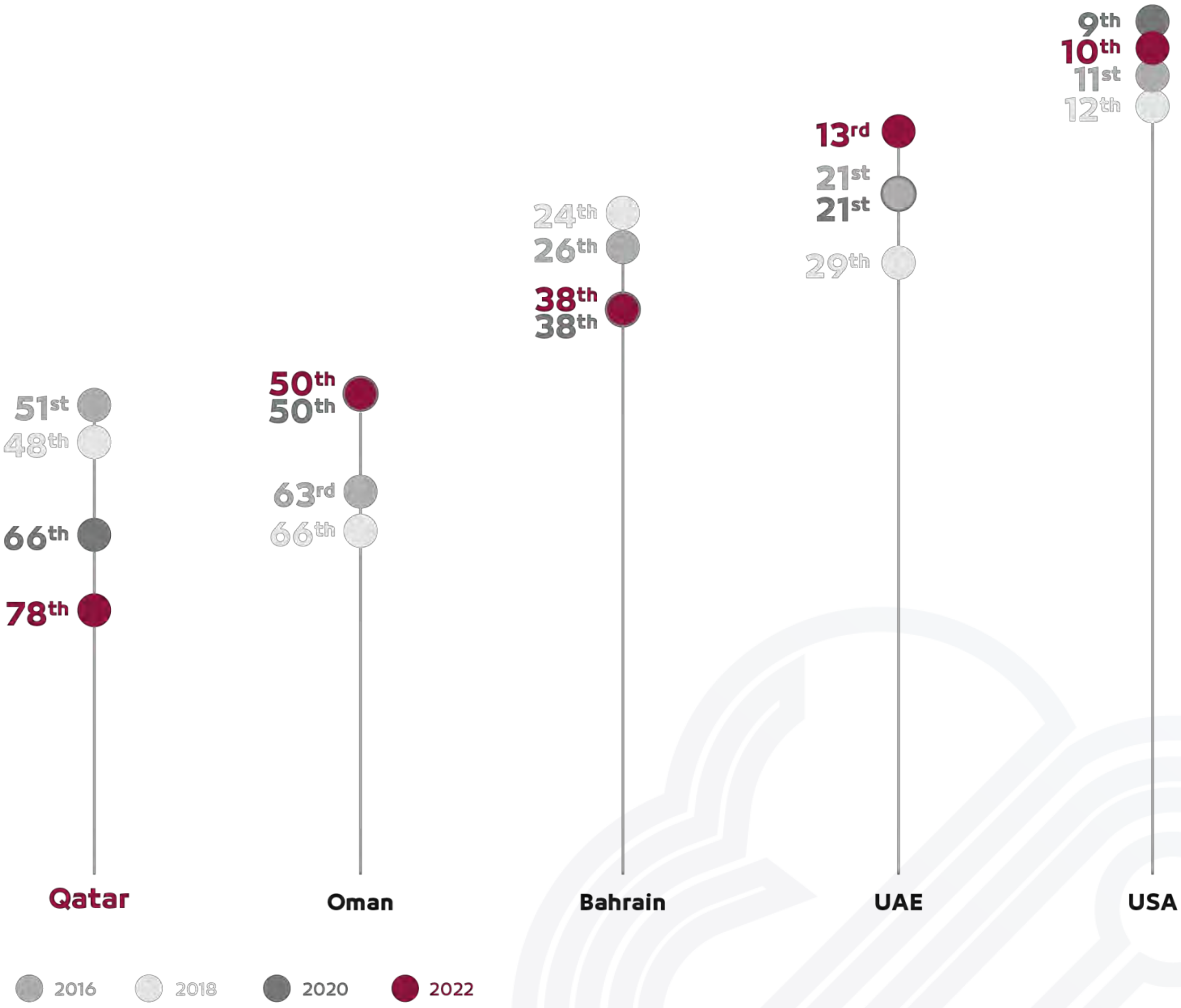
[93] The World Bank database

[94] CRA, Cloud Policy Framework, https://www.cra.gov.qa/en/document/cloud-policy-framework#:~:text=The%20Cloud%20Policy%20Framework%20defines,data%20centres%20and%20cloud%20services.

Beyond e-government, other projects such as the recently-launched Smart Qatar platform (TASMU, 2021), initiatives linked for the 2022 FIFA World Cup legacy program and other upcoming major events like the 2030 Asian Games, and the continued implementation of the Qatar National Vision 2030 will also drive further government spending and investments in ICT.

In particular, large demand for ICT solutions is expected to be driven by the TASMU Smart Qatar Program, which endeavors to leverage technology and innovation to improve the quality of life for citizens as well as help drive Qatar's economic diversification. Focused on developing a digital-enabling environment and bolstering the digital innovation ecosystem, the program has already launched the TASMU Platform and awarded digital solutions which will help drive digitalization across five prioritized sectors (Table 2).

**Figure 47. Ranking of Qatar and Selected Countries on e-Government Development Index, 2016-2022**



Source: United Nations e-Government surveys

Table 2. Priority Sectors Benefitting from TASMU Digitalization Initiatives

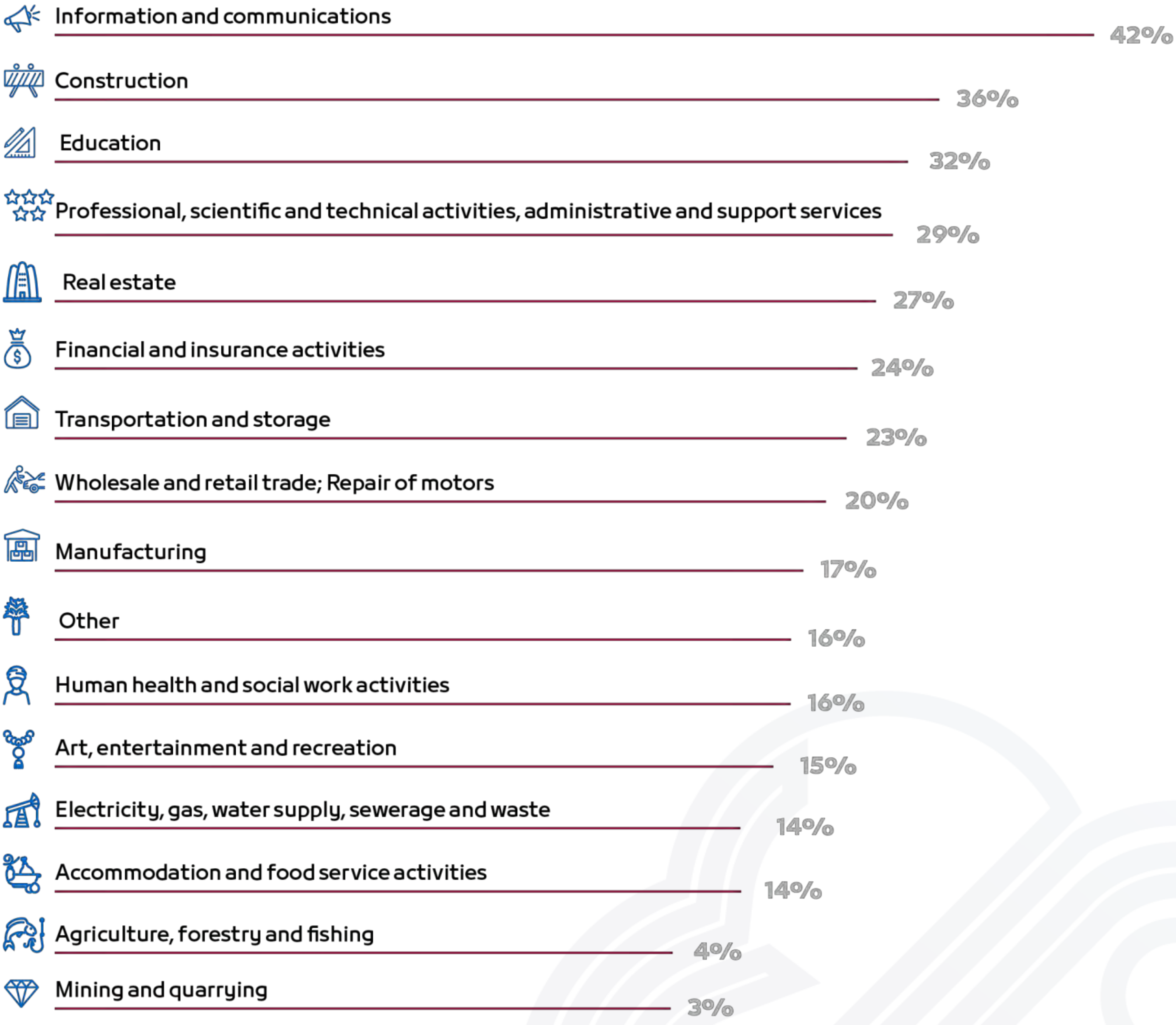
| TASMU Priority Sectors | Main Sector Goals | Sector Themes | Awarded Solutions |
|---|---|---|---|
| **Transport**<br>Facilitate mobility through a safe and environment-friendly transport network | **20%** reduction in road network delays<br>Reduce road fatalities to **6** per 100,000<br>**10%** reduction in average vehicle trip emissions | Seamless Mobility<br>Searchable City<br>Universal Access<br>Safe Journey | Smart Parking<br>Real-time Crowd & Transport Management |
| **Logistics**<br>Grow a competitive logistics sector that promotes international trade and drives business development | Cutting import costs by **50%**<br>Raising Logistics Performance Index to **12th** place<br>Increasing GDP contribution of Logistics to **10%** | Connected Logistics<br>Digital Workplace<br>Dynamic Delivery<br>Empowered Recipients | Digital Auction Place |
| **Environment**<br>Drive sustainable consumption of natural resources and ensure water and food security | Reduce per capita energy consumption by **6%**<br>Reduce per capita water consumption by **10%**<br>Produce **40%** of overall food consumed locally | Sustainable Resources<br>Digital Urbanization<br>Connected Farming<br>Environmental Stewardship | National Food Security Analytics<br>Digital Farmer Community<br>Livestock Monitoring & Analytics<br>Smart EV Charging Platform |
| **Healthcare**<br>Generate an increase in population access to quality healthcare and reduce the risk of chronic diseases | Halt the rise in obesity<br>Reduce the rate of smoking by **5%**<br>Improve timely access to medical attention | Self-Care & Health Awareness<br>Digital Wellness<br>Connected Care<br>Remote Care & Management | Virtual Consultation<br>Digital Fitness & Nutritional Guide<br>Pregnancy & Baby Care<br>Smoking Cessation |
| **Sports**<br>Establish a world-class destination for sports fan experiences, athlete training and sports innovation | Develop capabilities to manage events up to **150,000** visitors annually<br>Achieve a **Top 50 ranking** in the Olympics<br>Achieve an active population level of **25%** | Active Nation<br>Connected Fan Experience<br>Competitive Athletes<br>World-Class Event Delivery | |

Source: TASMU

## 11 – The private sector has the potential to increase its ICT spending as a result of global digitization trends and local government push (e.g., TASMU), with National Champions presently being and continuing to be key drivers of digitalization efforts

Qatar has utilized government impetus and government ownership to drive the early growth of the digital economy enabled by ICTs. In the next phase of development towards a knowledge-based economy, Qatar will increasingly focus on sustaining the digitalization of the private sector through legislative, regulatory, financial and other types of support.

Figure 48. Industry Verticals Where Private Sector Clients of ICT Companies in Qatar Operate (% of respondents with clients in a given industry)



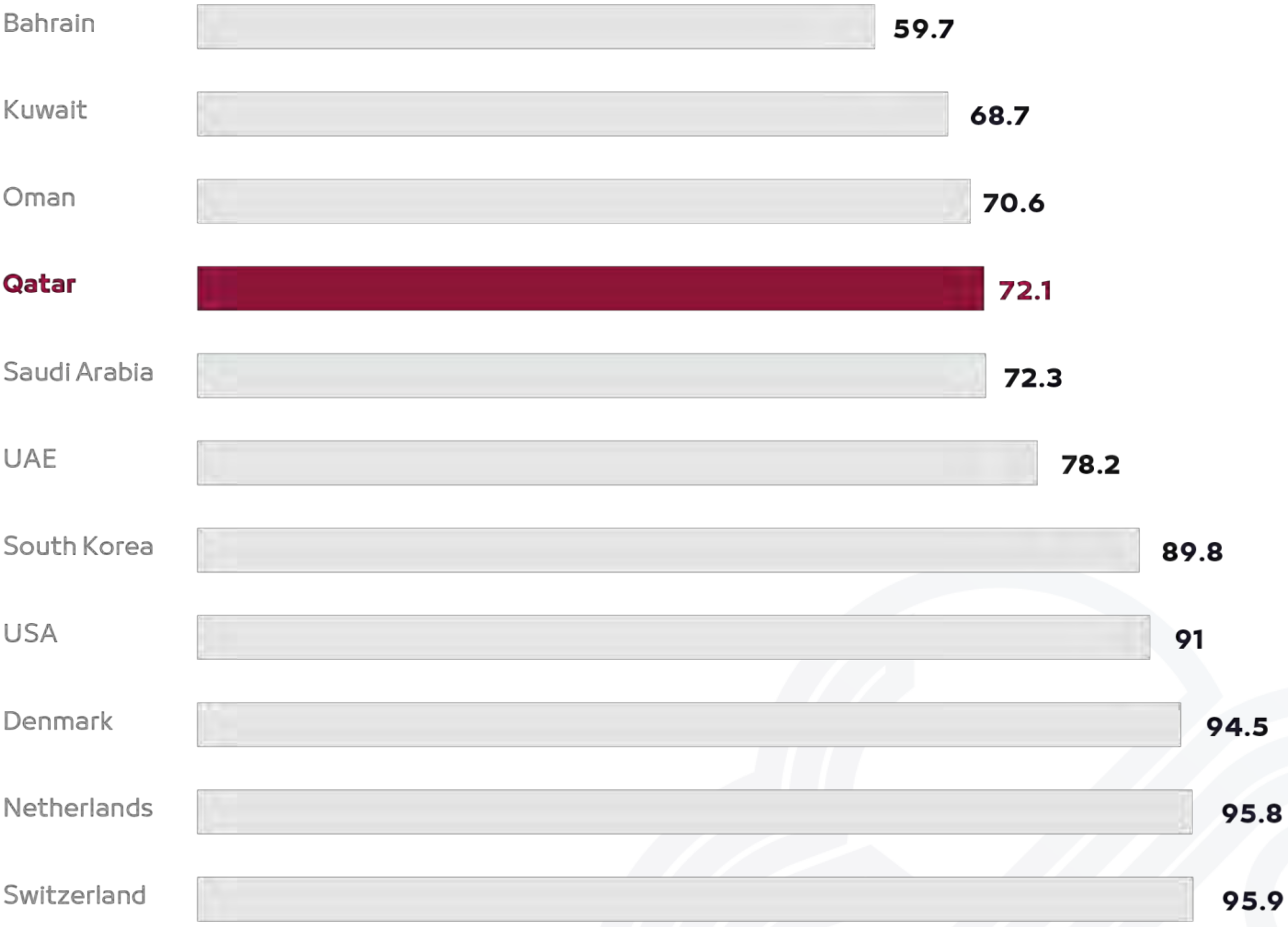
n = 362

Source: CRA ICT Sector Survey, 2022

Based on the CRA ICT Sector Survey 2022, most private sector customers served by the respondents operate within the *Information and Communications* sector, followed by *Construction* and *Education* (Figure 48).

Although these industries will likely continue being important spenders on ICT solutions, Qatar's economic structure, global digitalization trends and local initiatives suggest that other sectors might increase their contribution to ICT. Healthcare, utilities, accommodation, agriculture and mining are major industries which are globally experiencing increasing digitalization. At a local level, TASMU has prioritized five sectors – transportation, logistics, environment, healthcare and sports – to be at the core of digitization initiatives in Qatar. Targeted government policies and initiatives can accelerate the adoption of digital business solutions throughout the private sector; for example, in 2019, Australia launched a Small Business Digital Champions program which provides support to a small number of SMEs for their digitalization effort and has introduced a system that enables business payroll software to directly communicate information to the tax authority. Similarly, Austria and Australia provide consultancy to help firms digitalize[95].

**Figure 49. UNCTAD B2C e-commerce Index of GCC and ICT-Developed countries (2016-2020)**



Source: The World Bank Database

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[95] OECD, *Going Digital in Latvia*, 2021, https://www.oecd-ilibrary.org/sites/cf006e1b-en/index.html?itemId=/content/component/cf006e1b-en#chapter-7

One clear opportunity is the increasing demand for and supply of e-commerce services in Qatar. As evident from the UNCTAD B2C E-commerce Index[96], although at par with GCC benchmarks, Qatar still lags ICT-advanced economies in terms of preparedness for e-commerce (Figure 49). This indicates untapped potential for IT companies that can participate in the development of the e-commerce ecosystem in Qatar and in the region. However, some structural inhibitors will need to be addressed as a thriving e-commerce ecosystem requires supportive payment regulations and services, data regulations and highly efficient postal services.

Qatar's private sector includes multiple semi-governmental companies and national champions (e.g., Qatar Airways, Al Jazeera, BeIN), some of which are committed to increasing the digitalization of their businesses.

In May 2022, BeIN Media Group and Microsoft signed an MoU to expand their collaboration to accelerate the adoption of the cloud in media and accelerate digital transformation. In particular, the two companies will explore innovative and agile solutions to enhance operational excellence through artificial intelligence (AI) and will design a technology roadmap leveraging the cloud to contribute to BeIN's cost optimization and operational excellence objectives[97].

Hamad International Airport, operated by the Qatar Airways Group, launched the multi-phase Smart Airport Program in 2018. The ongoing second phase of the program continues the major digital transformation of airport services and operations, including leveraging biometrics and facial recognition to further streamline the passenger journey, and building on data analytics, artificial intelligence, and 3D modelling techniques to optimize operations (e.g., the Digital Twin Initiative).

Hamad Medical Corporation has been deploying successful digitalization initiatives to improve both customer experience and operations, including an intelligent security platform for employees and a suite of digital services for patients[98]. Similarly, Sidra Medicine has implemented multiple digitalization projects; for instance, using Da Vinci surgical robots, adopting a digital platform for the anatomical pathology laboratory[99] and signing an MoU with Microsoft to facilitate its research division's digital transformation goals and accelerate its precision medicine and genomics research programs (October 2022)[100].

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[96] The UNCTAD B2C E-commerce Index measures an economy's preparedness to support online shopping on the scale from 0 to 100.

[97] Microsoft News Center Middle East & Africa, May 30, 2022

[98] Hamad Medical Corporation news, July 7 2019, https://www.hamad.qa/EN/news/2019/July/Pages/HMC-Wins-Microsoft-Qatar-Digital-Transformation-Award.aspx

[99] Sidra Medicine Newsroom, March 1 2020, https://www.sidra.org/media/newsroom/2020/march/sidra-medicine-pathology-labs-go-digital

[100] Sidra Medicine Newsroom, October 25 2022, https://www.sidra.org/media/newsroom/2022/sidra-medicine-signs-mou-microsoft-achieve-digital-transformation-goals

Mobilization of support from national champions to localize part of their IT expenditure or facilitate partnership between international and local providers in leading projects is a potential source of growth for Qatar's local ICT industry, with multiple ICT stakeholders interviewed by the CRA sharing the view that state-backed enterprises can help drive sector growth by increasing the share of products and services sourced locally, but also by actively collaborating with initiatives that promote the generation of local knowledge, value and innovation. This may include being active partners in RDI activities, supporting small, innovative companies by testing their products in the market, and hiring locally.

> **There is room for improvement in terms of coordination between major players in Qatar, in particular, national champions can contribute more to creating the ecosystem, for example increasing their participation in innovation projects.**
>
> **— Qatari media accelerator**

# Infrastructure

## KEY FINDINGS

Connectivity Infrastructure

**01**

Qatar has invested and built a robust ICT infrastructure over the past decade that can be the backbone of the digital economy

**02**

Mobile networks provide universal high-quality 4G services across Qatar, and mobile speeds are at top global levels

**03**

Fixed broadband has universal population coverage and provides robust service and speed performance

**04**

Prices for retail connectivity in Qatar are competitive at a GCC level, but remain higher than international benchmarks (OECD) – especially for fixed broadband

**05**

The satellite segment sees development through an enhanced offering of existing providers and through the recent entry of Starlink Satellite Qatar in the local market

**06**

Significant investments and progress have been made in localizing data centers in Qatar, however non-competitive connectivity cost, lack of talent, and limited demand for cloud services remain key challenges to be addressed

**07**

The public and private sector must collaborate to further enhance Internet connectivity in Qatar to further reduce cost and latency, boost content localization, and increase demand for cloud services

Other infrastructure supporting the digital economy

**08**

Current market and regulatory developments, including the launch of Apple Pay and Google Pay in Qatar, are driving nationwide fintech and payment gateway adoption

**09**

The postal network and related services have improved significantly in recent years, yet further development is required to fully support the digital economy

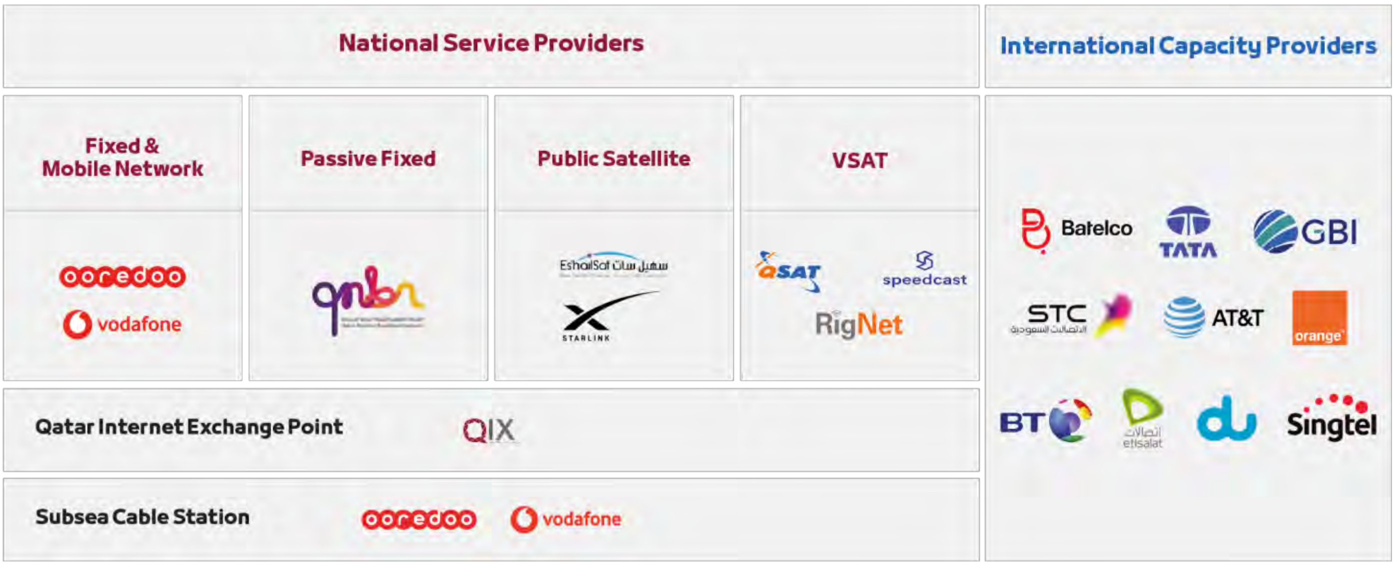
# Connectivity Infrastructure

## 1 – Qatar has invested and built a robust ICT infrastructure over the past decade that can be the backbone of the digital economy

A well-developed, high-quality, affordable ICT infrastructure is key to promoting the industry and enabling digital transformation across all economic sectors. Qatar has an excellent fiber and mobile infrastructure including 5G, that, together with recent investments in data centers can help strengthen the digital economy. This infrastructure is core to supporting individuals' increasing demand for connectivity as well as meeting public and business sector needs related to cloud services, IoT, big data and more.

Qatar's current telecommunication infrastructure spectrum of players is summarized in Figure 50.

**Figure 50. Qatar Connectivity Infrastructure Snapshot (2022)**


National Service Providers
International Capacity Providers
Fixed & Mobile Network
Passive Fixed
Public Satellite
VSAT
ooredoo
vodafone
qnbn
EshailSat سهيل سات
STARLINK
QSAT
speedcast
RigNet
Batelco
TATA
GBI
STC الاتصالات السعودية
AT&T
orange
BT
اتصالات etisalat
du
Singtel
Qatar Internet Exchange Point
QIX
Subsea Cable Station
ooredoo
vodafone

Source: CRA

## 2 – Mobile networks provide universal high-quality 4G services across Qatar, and mobile speeds are at top global levels

With 99.8% population coverage, 4G remains the core of Qatar's mobile network. However, the country is also a leading adopter of 5G technology: by the end of 2021, Ooredoo and Vodafone provided 5G coverage to around 96% of Qatar's population[101] – mere percentage points away from their goal of universal coverage by the end of 2022 (Figure 51). Flagship 5G projects include implementing coverage in stadiums for the 2021 FIFA Arab Cup in preparation for the 2022 FIFA World Cup, 2022 as well as transforming Hamad Port into the first 5G-enabled seaport in the Middle East.

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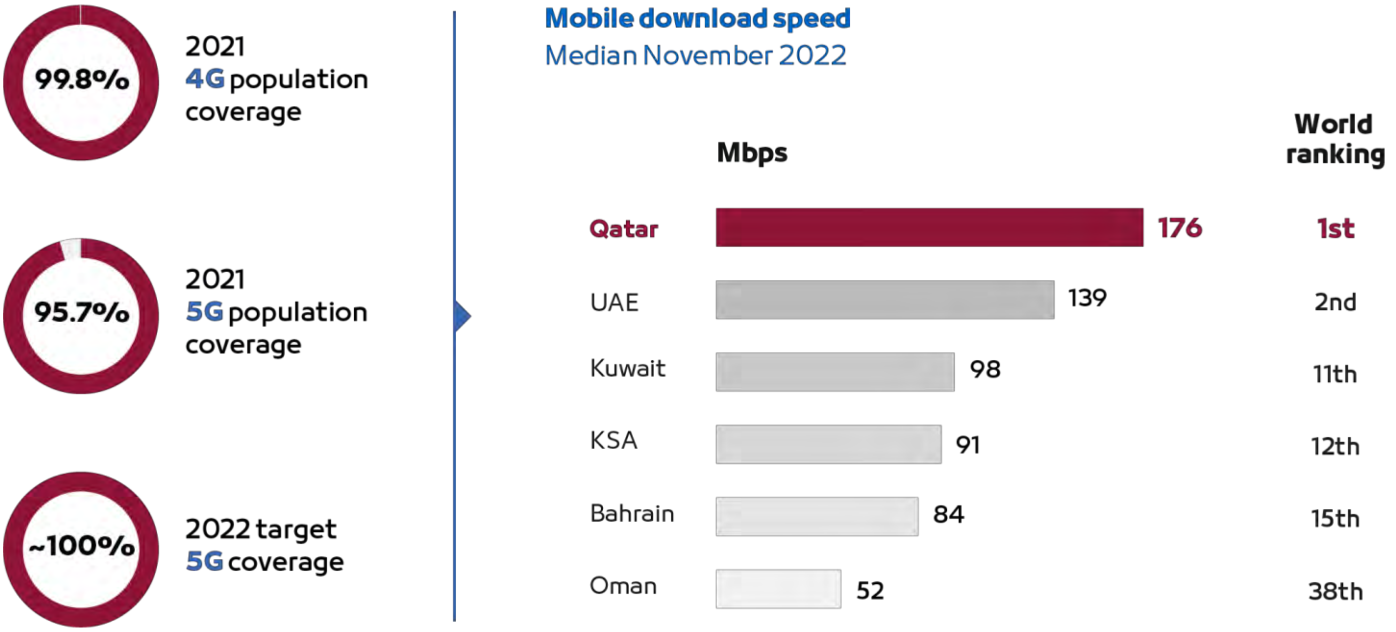
[101] CRA, Qatar Telecommunications Market Quarterly Report No. 4/2021

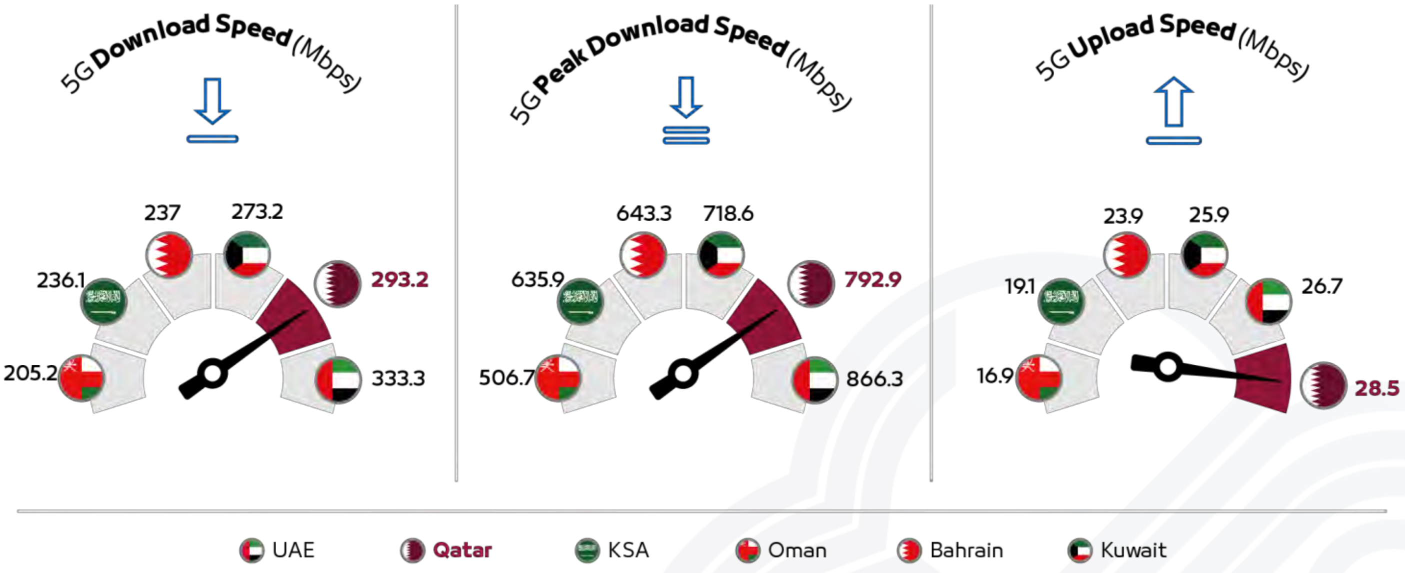
Figure 51. Qatar's Mobile Network Statistics



Source: Speedtest by Oakla, CRA

The overall mobile connectivity speed in Qatar is at the top worldwide. Similarly, the speed of the 5G network was ranked in the top 15 globally and in the top two in the GCC in October 2022[102] (Figure 52). Qatar's mobile infrastructure is world-class and 5G implementation has been extensive, enabling the market to more effectively leverage other emerging technologies like IoT and cloud services.

Figure 52. Benchmark of 5G Speeds in Qatar and Among GCC Peers



Source: Open Signal 2022, Data collection period from 1 August – 29 October 2022

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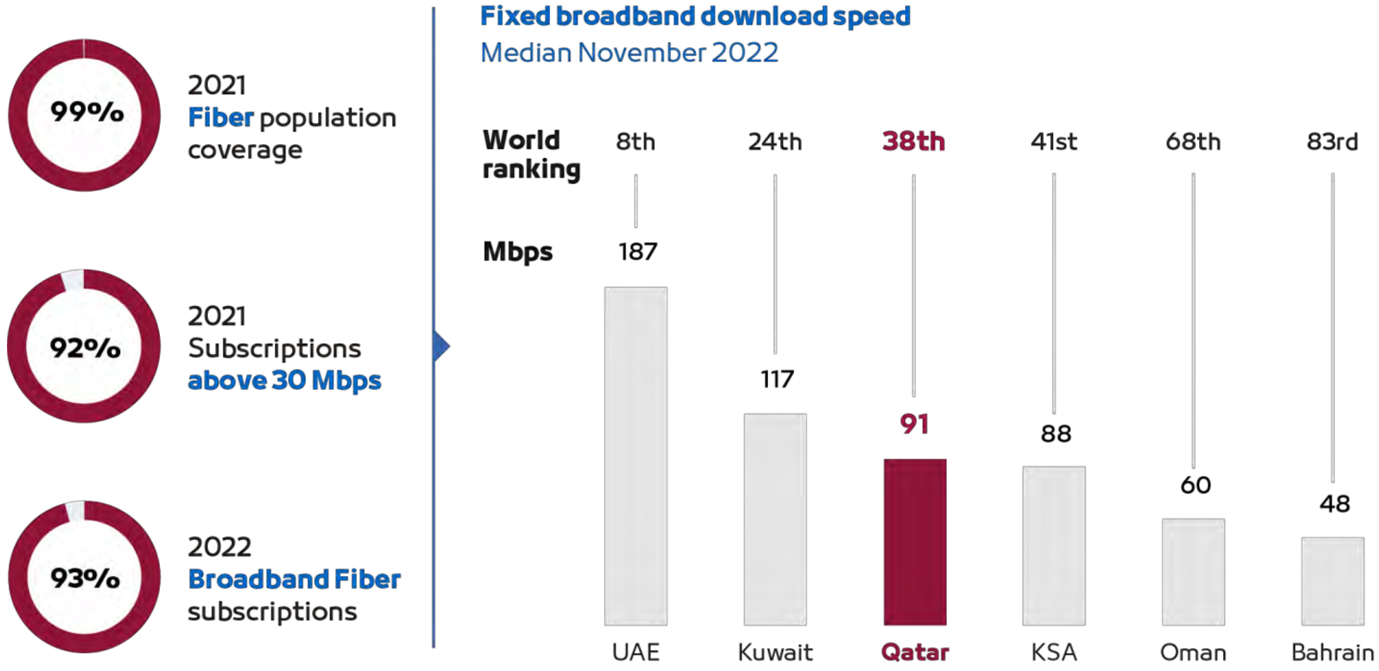
[102] Open Signal, Benchmarking the Global 5G Experience, https://www.opensignal.com/2022/12/01/benchmarking-the-gcc-5g-experience-december-2022 https://www.opensignal.com/2022/06/22/benchmarking-the-global-5g-experience-june-2022

## 3 – Fixed broadband has universal population coverage and provides robust service and speed performance

Fiber networks are a vital component of the telecommunications infrastructure even in the presence of high-speed mobile broadband; in fact, they are key in supporting 5G backhaul infrastructure and cellular traffic offloading through Wi-Fi[103]. With 99% fiber population coverage, Qatar is one of the leading countries for deployment of fiber infrastructure. Although robust, fixed broadband speeds can still improve to reach best performing global benchmarks by leveraging the state-of-the-art infrastructure (Figure 53).

Figure 53. Qatar's Fixed Broadband Statistics



Source: Speedtest by CRA Ookla

## 4 – Prices for retail connectivity in Qatar are competitive at a GCC level, but remain higher than international benchmarks (OECD) – especially for fixed broadband

Both company survey and stakeholder interviews highlight value-for-money for connectivity in Qatar as an area for improvement. Just over half of the ICT companies surveyed believe that the local telecommunication services provide good value for money, with international businesses being more critical than local ones.

This perspective is corroborated by a 2021 international price benchmark study conducted by Teligen/Strategy Analytics of fixed broadband business plans and residential mobile data and voice services plans[104]. This study found that plans in Qatar were generally on par with other GCC countries, but more expensive than OECD averages, especially for fixed broadband

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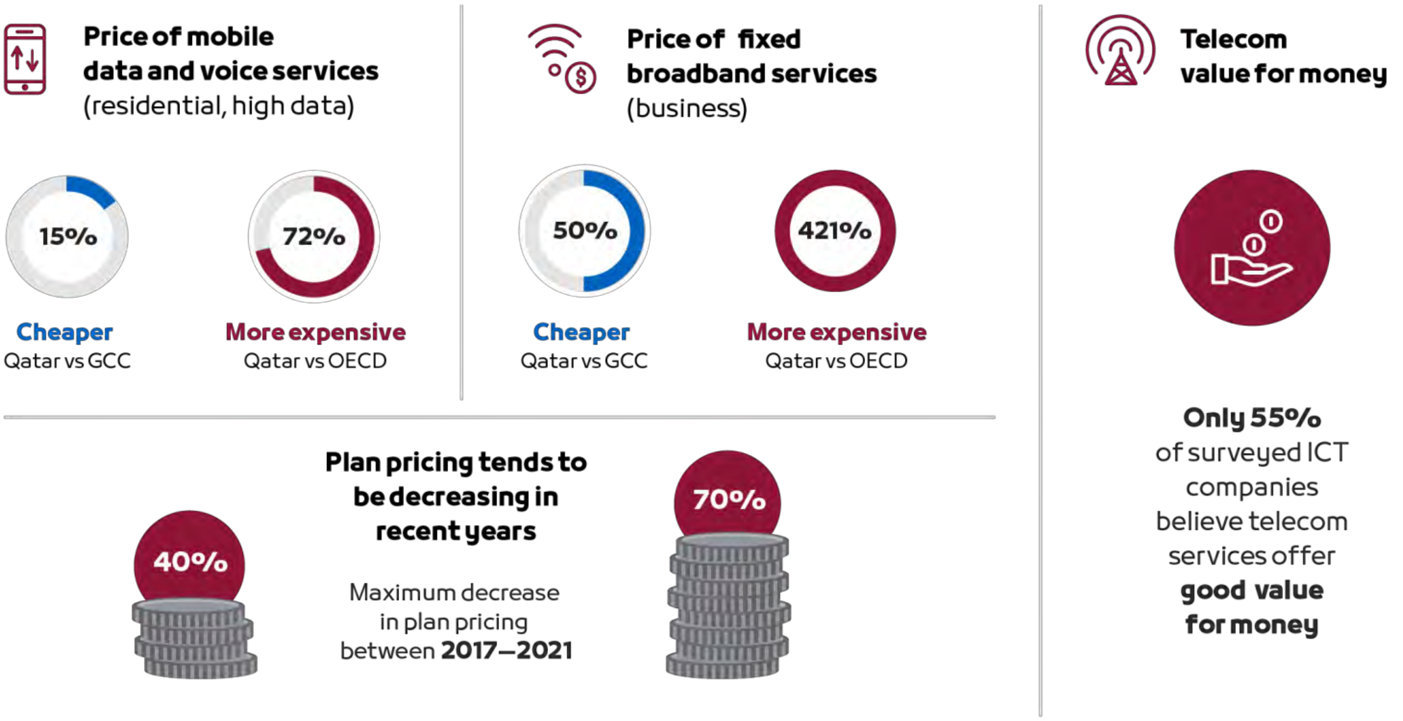
[103] OECD, Digital Economic Outlook 2020, https://www.oecd-ilibrary.org/science-and-technology/oecd-digital-economy-outlook-2020_bb167041-en

[104] CRA, *Telecom price benchmarking*, https://www.cra.gov.qa/document/telecom-price-benchmarking-study

(Figure 54). Similarly to other GCC countries, this is partially driven by limited competition in the telecommunication segment. It is worth highlighting, however, that prices of voice and Internet plans have been decreasing over time: higher data-usage mobile plans fell by as much as 40% between 2017 and 2021, and fixed broadband business plans decreased in price by up to 70% during the same period.

**Figure 54. Value for Money of Qatari Telecommunication Products**



Source: CRA Telecom Pricing Benchmarking, CRA ICT Sector Survey 22022

Overall, both price benchmarks and surveyed perceptions indicate that the ICT sector faces telecom's value-for-money as a barrier. As recognized by the CRA in its 2020-2024 Strategy, bringing connectivity prices closer to international benchmarks is key to enhancing the competitiveness of Qatar's ICT industry: unaffordable services detract from sector growth, undermining the nation's goal of becoming a global digital hub. Consequently, this priority must be a regulatory focus in the short and medium term.

## 5 – The satellite segment sees development through an enhanced offering of existing providers and through the recent entry of Starlink Satellite Qatar in the local market

Established in 2010, Es'hailSat is the first and primary satellite operator in Qatar. Through operation of two Ka- and Ku-band satellites with an average age of six years, Es'hailSat provides broadcast, telecommunications, and VSAT services to a range of public and private-sector entities[105]. Recent investments by Es'hailSat include the 2019 development of a 50,000 sqm

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[105] Satelliteprome, https://satelliteprome.com/news/operators/teleport/eshailsat-blueprint-for-qatars-space-future/

teleport in Doha and the commissioning of an iDirect hub[106]. This infrastructure enables the company to continue offering competitive services, and with its enhanced Satellite News Gathering service, will be critical to broadcasting the 2022 FIFA World Cup[107]. Other significant developments include the recent licensing of Starlink Satellite Qatar, owned by SpaceX. This individual license permits Starlink Satellite Qatar to provide low latency (20-40ms), high-speed internet service (150-500 Mbps) to individuals and businesses in Qatar as well as those off-shore or on aircraft[108] based on a new generation of low-orbit satellites that are transforming the satellite segment into a provider of critical infrastructure connectivity.

## 6 – Significant investments and progress have been made in localizing data centers in Qatar, however non-competitive connectivity cost, lack of talent, and limited demand for cloud services remain key challenges to be addressed

Over the past decade, Qatar has invested in and built a robust ICT infrastructure that can serve as the backbone of the digital economy. The importance of localizing data center capacity grows with Qatar's increasing focus on boosting cloud services and edge computing domestically, following global trends with the intention of becoming a digital hub. Localized data centers reduce latency for regional users, enable cost-effective solutions and lower energy costs, and increase reliability of solutions given the strong local infrastructure. These factors have spurred significant development in Qatar's data center connectivity (Figure 55).

Figure 55. Recent Data Center Developments in Qatar

**Meeza**, within the Qatar Science & Technology Park, has constructed 4 Tier III certified data centers, the last of which was completed in 2021.

In 2022, **Microsoft** launched their global data center in Qatar and are hosting Microsoft Azure within Meeza and Ooredoo's data centers.

**Ooredoo** has expanded their government data center, now known as QDC5, to be a Tier III data center with modular capabilities serving government entities of all sizes.

**Quantum Switch** went live in 2022 with its first 6MW datacenter in Qatar and will soon launch another one. The data center is currently hosting Google Cloud.

Source: CRA, MEEZA, PRNewsWire

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[106] Spacewatch Global, https://spacewatch.global/2022/09/spacewatchgl-share-satellite-services-from-qatars-eshailsat-for-all-of-mena/

[107] Telecomreview, https://www.telecomreview.com/articles/exclusive-interviews/5531-es-hailsat-enhancing-future-capabilities-as-a-satellite-operator

[108] CRA news, https://www.cra.gov.qa/press-releases/cra-issues-a-telecommunications-license-to-starlink-satellite-qatar

While data center infrastructure is improving in Qatar, stakeholder interviews have highlighted that the existing offering focuses mainly on the needs of the public sector, resulting in solutions that are often less suitable and unaffordable for SMEs. Stakeholders suggest addressing the challenge by bundling and subsidizing solutions and, potentially, expanding the offering of carrier-neutral data centers.

> **We [Qatar] have done exceptionally well when it comes to building infrastructure, but the intelligence part is missing. There is strong initiative to build capacity, but the system still does not work well in terms of making sure there is demand for that capacity.**
>
> **— Corporation**

Cloud services and accompanying data centers are central to Qatar's transformation into an international digital hub. However, interviewed market players stress that the government should now shift its focus from infrastructure to development of the surrounding ecosystem, ensuring these resources can be fully leveraged. In addition to affordability of services, stakeholders have identified talent availability as a barrier to growth. Without trained talent that can properly use emerging solutions, demand for infrastructure and accompanying services will remain low across sectors, especially among SMEs. With additional support, the ecosystem could promote accessibility and affordability of available infrastructure capacity and attract the talent needed to drive further demand within both the public and private sectors.

### 7 – The public and private sector must collaborate to further enhance Internet connectivity in Qatar to further reduce cost and latency, boost content localization, and increase demand for cloud services

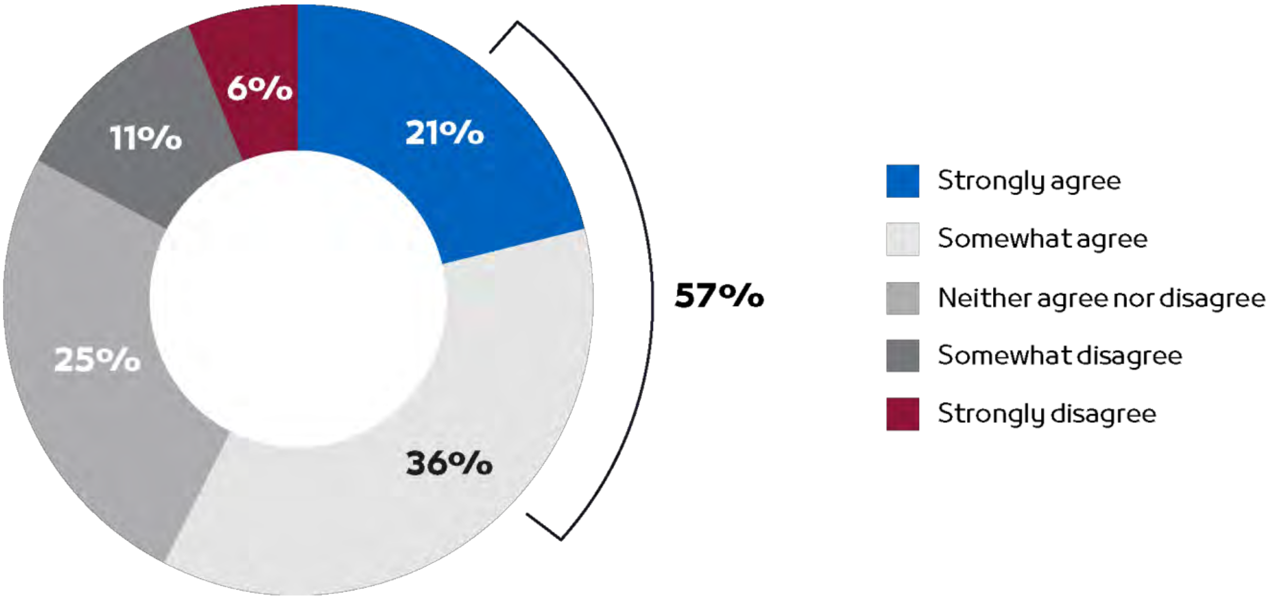
In 2018, Cabinet Decision No. (24) formed the Qatar Internet Exchange Point Steering Committee to develop Internet infrastructure that supports the ICT sector by providing faster, more reliable and more secure access to internet services. In collaboration with stakeholders like MEEZA, Vodafone Qatar and Ooredoo Qatar, the CRA helped establish the first Qatari IXP in January 2020 with the goal of reducing dependency on international connectivity. The IXP infrastructure is currently being revamped from a single site with no redundancy to three different data centers and further expansion plans are underway. These developments will support localization of content, enhance customer experience and protect against outages. Agreements have already been made for providers including Ooredoo, Vodafone, GBI, Microsoft and Meta to localize content. Increased content localization will further drive demand for cloud services.

In addition to creating multiple IXPs, developments have also been made in terms of international connectivity: in February 2022, Vodafone Qatar signed a 20-year agreement with the Saudi Telecom Company to construct and operate an undersea cable project which will link Qatar to the largest cable system in the world, 2Africa. This not only facilitates increased network speeds, but also supports Qatar in becoming a global digital hub.

## Other Infrastructure Supporting the Digital Economy

### 8 – Current market and regulatory developments, including the launch of Apple Pay and Google Pay in Qatar, are driving nationwide fintech and payment gateway adoption

**Figure 56. ICT Sector Agreement of a Competitive Selection of Payment Gateways that Support e-Commerce in Qatar (% of respondents)**



Source: CRA ICT Sector Survey 2022

Payment gateways are a fundamental component of digital infrastructure., and 57 percent of surveyed ICT companies believe that Qatar offers a competitive selection of payment gateways (Figure 56). This is a 9-percentage point improvement since the CRA polled the sector in 2019 as part of the strategic sector review. In fact, while the CRA was conducting the survey this year, major developments were actively occurring on this front: in August 2022, Apple Pay[109] and Google Pay[110] were formally launched in Qatar. In September 2022, MOCI issued a requirement for all shops to provide consumers with electronic payment options and indicators that Apple Pay, Samsung Pay and Google Pay services are now accepted in Qatar in order to promote cashless payments and support customer experience[111]. In addition to these mature services, other digital payment solutions have recently been licensed including the Qatari startup C-Wallet's solution, in addition to mobile money solutions by Ooredoo and Vodafone. The focused efforts of the government to provide a complete infrastructure for electronic payment systems in the country and developing supporting regulation, and increased introduction of digital payment services represents a significant step towards a competitive landscape for ICT businesses engaging in e-commerce.

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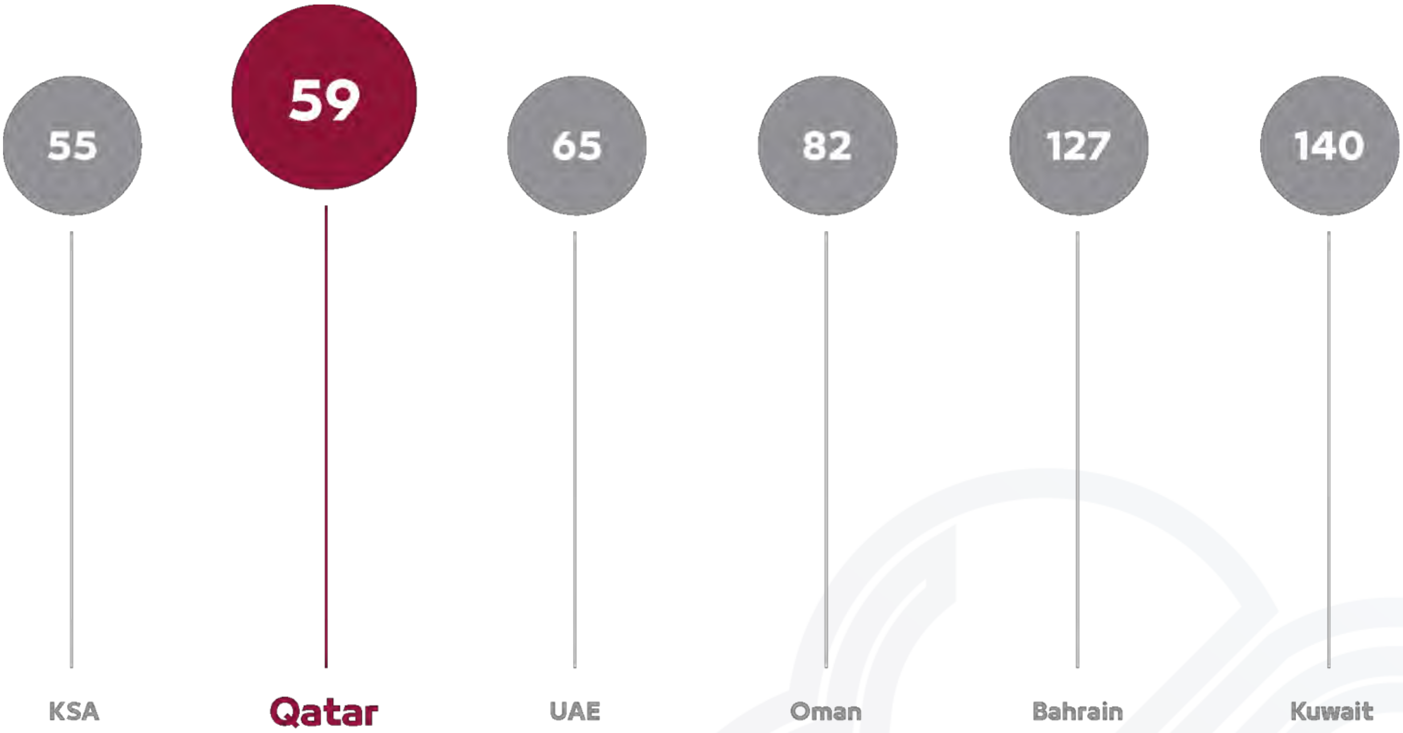
[109] Dohanews, https://dohanews.co/qnb-customers-can-now-pay-using-iphones-or-apple-watches/

[110] QNB news, https://www.qnb.com/sites/qnb/qnbglobal/en/en24aug2022news

## 9 – The postal network and related services have improved significantly in recent years, yet further development is required to fully support the digital economy

A strong logistics and delivery system is vital for the digital economy, especially around e-commerce, which in turn relies on the ICT sector to enable services and platforms. Qatar's national postal service provider, Qatar Post, has improved significantly in recent years to meet industry needs; this is evidenced by the Universal Postal Union's global rankings which moved Qatar from 80th place in 2018 to 59th in 2021. Though KSA's postal service was ranked the highest within the GCC in 2021, Qatar's took 2nd place indicating its overall leadership in the region (Figure 57).

**Figure 57. Rank of GCC Countries' Postal Systems (2021)**



Source: Universal Postal Union, Integrated Index for Postal Development (2IPD)

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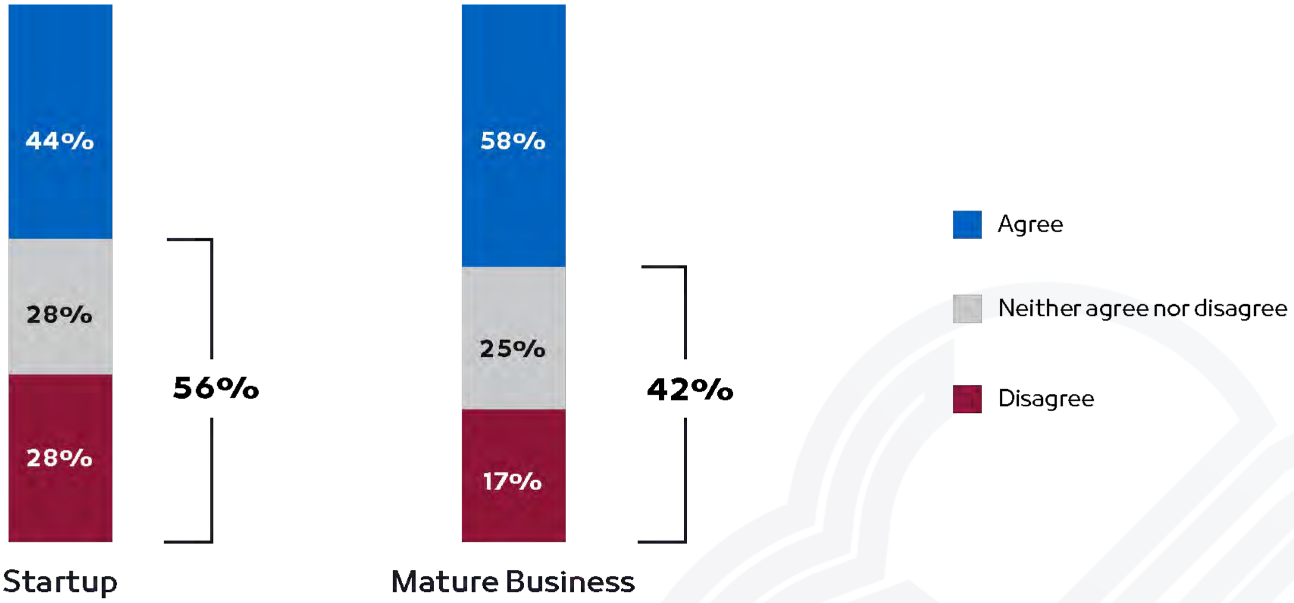
[111] MOCI

Despite recent improvements, the relatively low global rankings and CRA survey findings suggest room for further enhancement: about half of the survey's respondents are not fully satisfied with postal and courier services in Qatar. Startups, in particular, feel this way with 56% claiming they do not find postal and courier services adequate (Figure 58).

The CRA's 2019 Sector Review identified several challenges for Qatar Post including the lack of a regulatory framework, poor customer satisfaction and changing demand needs such as increased volume of parcels sent coupled with a decrease in volume of letters. Additionally, government funding to Qatar Post has decreased in recent years, contributing to the organization's challenges to adapt to and sustain business viability and financial sustainability. Qatar Post has been engaged in an organizational transformation for several years to address these challenges, having launched a variety of initiatives to improve internal resources, customer service and operations. Changes to date include online inquiry submissions, integration of business intelligence solutions, implementation of shipping API services to integrate with e-commerce platforms and a fully integrated point-of-sale solution[112]. As Qatar Post continues to look forward, it is focusing on big data implementation, last-mile delivery logistics, and plans to launch more digital services. Thanks to these ongoing developments, Qatar Post is expanding further to support e-commerce delivery models. It has obtained numerous international certifications and improved workplace safety, which should enhance its international ranking in future benchmarks while better meeting the needs of the ICT sector in Qatar.

**Figure 58. Adequacy of Cost and Quality of Postal & Courier Services in Qatar for ICT Sector Business Needs (% of respondents)**



Source: 2022 CRA ICT Sector Survey

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[112] Zawya, https://www.zawya.com/en/press-release/significant-achievements-on-many-levels-for-qatar-post-in-2021-plpqouy5

# Regulatory and Business Environment

## KEY FINDINGS

**ICT Institutional Setup, Developments and Industry Awareness**

**01** National emphasis on the ICT sector has been reflected through the formation of new government entities such as the Ministry of Communications and Information Technology and the National Cybersecurity Agency, along with activation of initiatives targeting the sector's regulatory framework and supporting Qatar's digital agenda and industry growth

**02** Although sector awareness of the CRA is still being established, ICT businesses have a firm grasp of the government's objectives and plans for the sector and there have been marked improvements as a result of targeted initiatives and sector engagement

**Industry Perceptions of Qatar's ICT Regulatory Environment**

**03** 60% of businesses find the local regulatory setup to be attractive and almost 75% recognize that there have been continual regulatory framework improvements

**04** Despite an overall positive perception, Qatar's regulatory environment is expected to be further developed to close remaining gaps when compared to regional leaders

**05** Data-related regulations remain an area for development, although the recently-published Cloud Policy Framework has been positively received by market players

**ICT Industry Perceptions of Qatar's Wider Business Environment**

**06** Just over half of ICT companies finds Qatar's business requirements hassle-free, thus signaling room for better efficiency – but startups and companies that operate internationally tend to have a less positive perception

**07** Key challenges affecting ease of doing business for ICT companies in Qatar relate to labor market and visa policies/processes and to obtaining permits and licenses – barriers which could be reduced through enhanced government interoperability and process transparency

**08** ICT businesses, particularly local startups and SMEs, believe that the current public procurement practices can represent a barrier to doing business with the government

# ICT Institutional Setup, Developments and Industry Awareness

## 1 – National emphasis on the ICT sector has been reflected through the formation of new government entities such as the Ministry of Communications and Information Technology and the National Cybersecurity Agency, along with activation of initiatives targeting the sector's regulatory framework and supporting Qatar's digital agenda and industry growth

### Growing importance of Qatar's ICT sector has resulted in creation of new government entities

As the ICT sector has become increasingly important to Qatar's national goals, the requirement for a strong institutional framework and regulatory environment is of paramount importance. In October of 2021, Amiri Decree No. 57 of 2021 defined a government reform and established the Ministry of Communications and Information Technology (MCIT) to supervise, support and develop the ICT sector. The newly-defined role of MCIT was previously administered by the Ministry of Transportation and Communications (MOTC), and as such the creation of the new, dedicated ministry recognizes the increasing significance of the ICT sector and represents a commitment to drive its growth in a more targeted manner. In a tangential act of support for the sector, Amiri Decree No. 1 of 2021 established the National Cyber Security Agency (NCSA) to be responsible for duties including proposal and development of cybersecurity policies, issuing certificates of compliance and regulating personal data privacy.

### Government entities' targeted initiatives are contributing to significant developments in the sector's regulatory framework and supporting sector-wide growth

As Qatar continues to prioritize the ICT sector as an enabler of the Qatar National Vision 2030, the importance of the CRA's role as a regulator is magnified given the CRA's mandate as the regulator of IT, telecom, access to digital media and the postal sector[113] in the State of Qatar. Since 2020, the CRA has been embracing its full mandate on ICT and targeting strategic initiatives across the sector alongside those led by other government entities (Table 3). These are focused on a revamp of the sector's regulatory framework in support of technology innovation, opening up and developing the ICT market, proactive engagement with the industry and promoting a world-class ICT ecosystem within Qatar.

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[113] To be activated after the Postal Law enactment

Table 3. Activities Undertaken by the CRA to Serve the ICT sector

| Initiative | Description | Impact | Status |
|---|---|---|---|
| **Conduct an annual IT sector survey** | Survey IT sector players on their experiences and perceptions of topics such as regulation, funding, talent, R&D and more | • Contribute to market landscape report<br>• Inform policy creation process<br>• Highlight opportunities and gaps in the market | • First comprehensive CRA ICT Sector Survey (supply-side) completed in 2022 |
| **Establish a framework for cloud services and data centers** | Develop regulatory foundation for a cloud-friendly ecosystem based on transparency, digital inclusion, privacy and best practices for data security | • Establish requirements which protect both individuals and companies<br>• Facilitate investment in data centers and cloud services | • Cloud Policy Framework published in June 2022 with implementation initiated by MCIT/CRA |
| **Develop a cloud computing handbook for SMEs** | Explain cloud computing, its various categories, typical elements of cloud contracts and key points to be aware of before paying for services | • Educate SMEs on cloud computing<br>• Support the digital transformation of SMEs<br>• Enable SMEs to reap cost savings and efficiency increases through cloud adoption | • Handbook published in July 2022 |
| **Develop a national blueprint for blockchain/DLT** | Highlight these technologies and their opportunities in Qatar, and identify required ecosystem components and regulatory foundation for thess technologies to thrive | • Support blockchain adoption in government and business sectors<br>• Outline government's approach to this technology<br>• Enable supportive environment for creativity and innovation | • Public consultation launched in August 2022<br>• Blueprint will be published in early 2023 |
| **Facilitate nationwide transition to IPv6** | Create an IPv6 taskforce to support the national adoption of IPv6 and develop IPv6 Dual Stack implementation guidelines | • Facilitate a smooth, nationwide transition to IPv6<br>• Educate stakeholders on benefits of IPv6 to increase adoption | • 30+ cross-sector entities in taskforce as of July 2022<br>• Dual stack guidelines published in December 2018<br>• Many entities are in the process of adopting IPv6 |
| **Draft digital regulation within the Free Zones** | While the cluster and regime has been internally established for QFZA, the CRA is supporting through developing dedicated digital regulation | • Create a digital market and attract major stakeholders to Qatar<br>• Enable and grow the local market<br>• Simplify regulation at a national level | • CRA supported QFZA with drafting the Internet Intermediary Liability Regime Regulations in 2022<br>• Framework for digital cluster in the Free Zones is expected to be initiated in 2023 |

| Initiative | Description | Impact | Status |
|---|---|---|---|
| **Establish an open IXP in Qatar** | Steering committee of cross-sector stakeholders to develop IXPs within the country and encourage content providers to localize content | • Increase customer experience, quality and speed<br>• Support cloud adoption<br>• Protect against network outages | • 2 IXPs have been established with plans for a third<br>• Major content providers such as Qatar Energy and Microsoft have recently been onboarded |
| **Formulate AI strategy and framework** | Develop National AI Strategy to support QNV 2030 and address needs faced by Qatar's society and economy as it adopts AI | • Support Qatar's adoption and implementation of AI technology<br>• Create foundation for a supportive regulatory environment | • National AI Strategy published in October 2019<br>• AI Committee held its first meeting in November 2022[114]<br>• Initiative will be led in 2023 by MCIT in conjunction with a variety of stakeholders |

Source: CRA ICT Sector Survey 2022

## 2 – Although sector awareness of the CRA is still being established, ICT businesses have a firm grasp of the government's objectives and plans for the sector and there have been marked improvements as a result of targeted initiatives and sector engagement

### Most ICT businesses clearly understand the government's objectives and plans for the sector, likely a result of the government's engagement efforts and clear public documentation

These engagement efforts not only support growth and development, but also help expand the sector's understanding of the government's ambitions for the industry: allmost 70% of ICT companies surveyed reported that they understand the government's objectives and plans to support future sector development. This widespread understanding is likely a result of public sector initiatives in addition to unifying documents like the Qatar National Vision 2030. As the government continues to engage and align with the ICT sector, businesses' awareness of its intentions will continue to be high.

### The CRA's visibility within the ICT sector is still somewhat low, but has seen clear growth thanks to recent regulatory initiatives and extensive engagement with the sector

With the CRA having only been established in 2014, less than 40% of ICT companies are well aware of its role, mandate or initiatives. This indicates that while the regulator has some visibility, it could still be significantly improved. Limited awareness around newer aspects of the CRA's regulatory activities in IT and overall ICT sector is understandable, as is the fact that startups tend to be less aware of the CRA's purpose and initiatives than mature companies (Figure 59).

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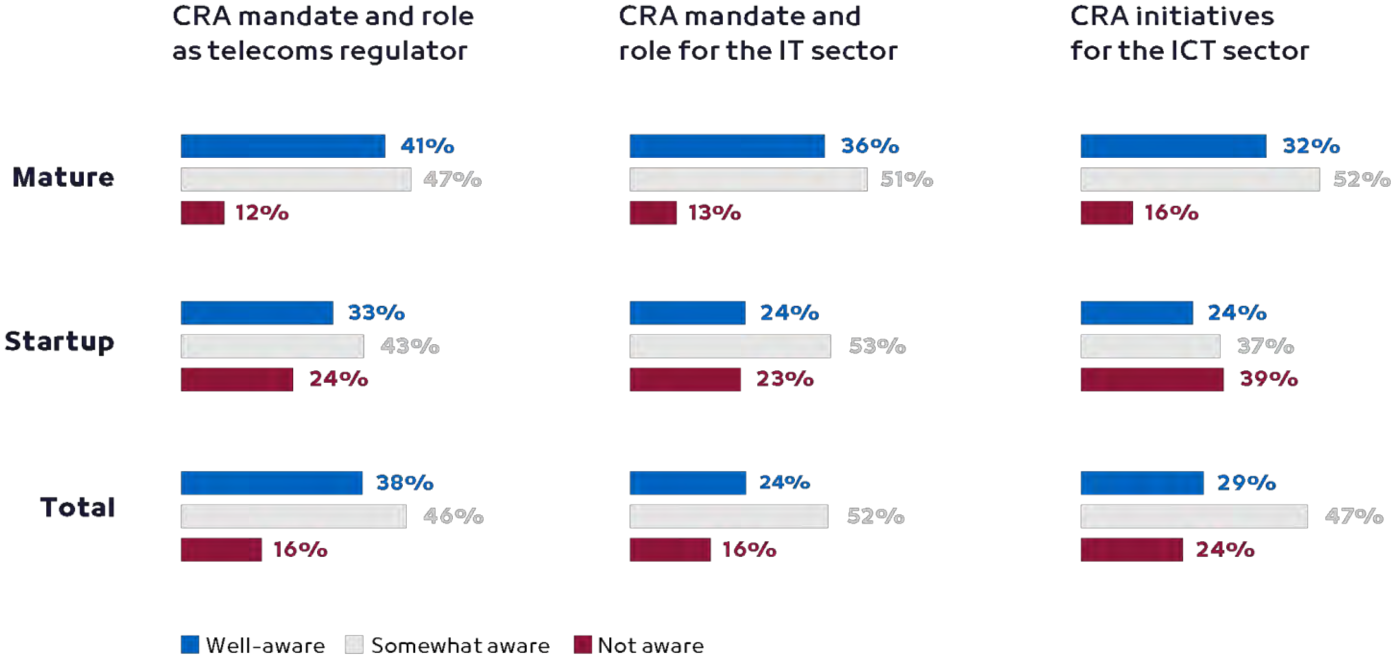
[114] Hukoomi news, 20 November 2022, https://hukoomi.gov.qa/en/news/the-artificial-intelligence-committee-holds-its-first-meeting

Figure 59. Respondent Awareness of the CRA's Mandate, Role, and Initiatives (% of respondents, by maturity)



n = 355

Source: CRA ICT Sector Survey 2022

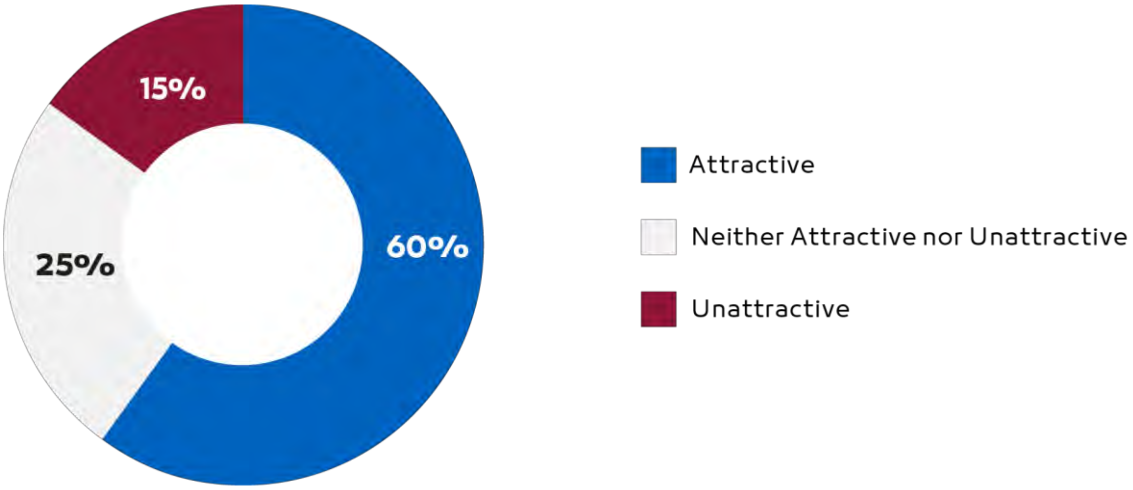
Compared to findings from previous research conducted by the CRA in 2019, it is clear that significant improvements have already been realized as the CRA has continued to grow into its mandate and role. The notable increase in industry awareness of the CRA is related to the regulator's activity in implementing targeted regulatory initiatives, engaging with the industry through events and workshops, and publishing authoritative research on the sector.

# Industry Perceptions of Qatar's ICT Regulatory Environment

## 3 – 60% of businesses find the local regulatory setup to be attractive and almost 75% recognize that there have been continual regulatory framework improvements

Based on the CRA ICT Sector Survey 2022, over half of ICT companies operating in Qatar consider the regulatory setup in the State attractive. Despite this prevailing positive perception, over 40% of respondents directly or indirectly do not agree which indicates room for improvement (Figure 60). This suggests that despite being viewed positively overall, the regulatory ecosystem still has room for enhancements.

Figure 60. Attractiveness of Overall Regulatory Setup in Qatar for ICT Businesses



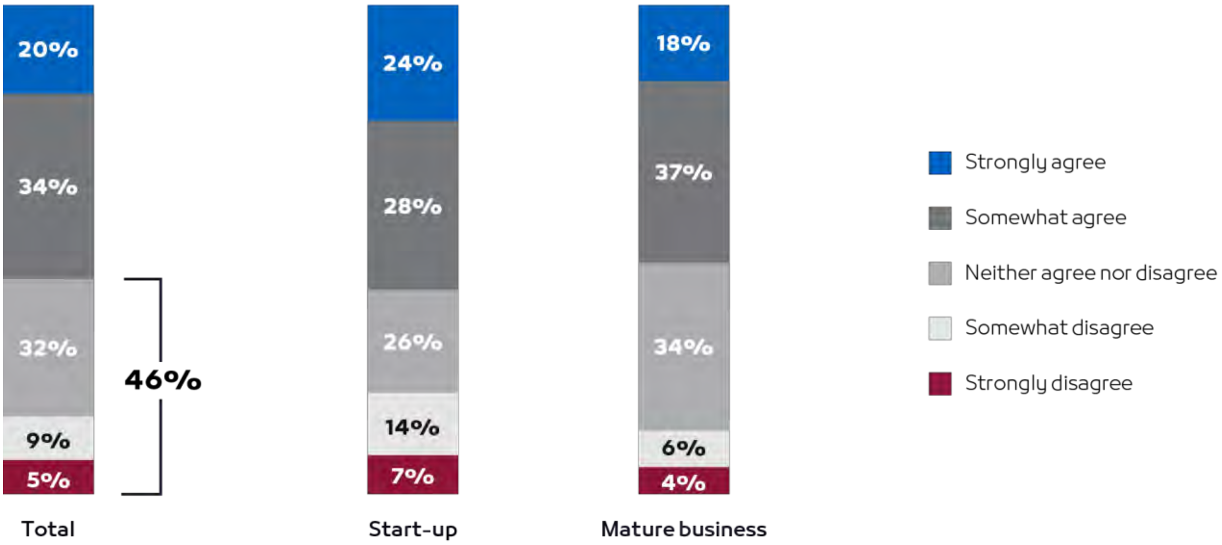
n = 362
Source: CRA ICT Sector Survey 2022

Almost 75% of survey participants agree that there have been continual improvements to the sector's regulatory framework. This widespread perspective amongst ICT companies is a testament to the effort and investment that the CRA and other government bodies have made in developing the sector framework and activating key initiatives. Furthermore, it reinforces the attractiveness of the existing regulatory setup and the government's commitment to supporting a robust ICT sector.

## 4 – Despite an overall positive perception, Qatar's regulatory environment is expected to be further developed to close remaining gaps when compared to regional leaders

Despite continual improvements reflected through overall positive perception, 46% of the companies responding to the CRA ICT Sector Survey 2022 do not see Qatar's regulatory environment as being yet on par with regional leaders (Figure 61); however, the neutrality of a large share of responses suggests that Qatar's performance does not fall considerably behind peers but requires further development. Startups are more critical of Qatar's regulatory setup than mature companies, suggesting that the ecosystem still needs to nurture younger and smaller companies as other GCC countries do.

**Figure 61. Comparison of Qatar's Regulatory Environment to Regional Peers (response rate by company maturity level)**



n = 355

Source: CRA ICT Sector Survey 2022

This perception captured through the mass survey is echoed by the insights collected from interviewed stakeholders: various startups share the opinion that Qatar's regulations need to catch up with top performing regional peers, and explained that the system would benefit from a more collaborative, experimental regulatory approach (Figure 62).

**Figure 62. Startups See Room for Improvement for Qatar's Regulatory Environment (Quotes from Interviews)**

> Regulations in Qatar are often one step behind regional peers
>
> — Startup

> There is a lack of communication channels with the government
>
> — Startup

> Qatar often regulates before experimenting which stifles innovation
>
> — Startup

Source: CRA ICT Sector Survey 2022

The world's most comprehensive benchmark on digital regulation, the International Telecommunication Union's (ITU) Benchmark of Fifth-Generation Collaborative Digital Regulation[115], places Qatar as 3rd within the GCC in 2021 (Figure 63). This benchmark is based on four pillars and helps explain the mixed perspectives on where Qatar ranks against its peers in terms of regulatory environment. The ITU index indicates the areas where Qatar's regulatory environment is on par with GCC countries as a whole, and where it lags behind predominant players in the region like the UAE and the KSA. This digital transformation framework gives visibility on priorities that Qatar must continue to focus to further develop the ICT sector and supports its way on becoming a regional ICT leader and digital hub.

In perspective, the next round of G5 benchmarks is expected to bring substantially improved rankings for Qatar in several areas as result of recent regulatory and policy updates.

**Figure 63. Benchmark of Fifth-Generation Collaborative Digital Regulation**

| | | UAE | KSA | Qatar | Bahrain | Oman | Kuwait |
|---|---|---|---|---|---|---|---|
| | G5 Benchmark Overall Ranking | 1 | 2 | 3 | 4 | 5 | 6 |
| **Pillar 1** | **National Regulatory Governance** | 1 | 2 | 4 | 5 | 3 | 6 |
| **Pillar 2** | **Policy Design Principles** | 2 | 1 | 5 | 4 | 6 | 3 |
| **Pillar 3** | **Digital Development Toolbox** | 2 | 1 | 3 | 5 | 4 | 6 |
| **Pillar 4** | **Digital Economy Policy** | 1 | 2 | 3 | 5 | 4 | 6 |

Source: International Telecommunication Union (2021)

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[115] ITU, *Benchmark Of Fifth-Generation Collaborative Digital Regulation (ITU)*, https://digitalregulation.org/wp-content/uploads/Final-version_clean_E.pdf

## 5 – Data-related regulations remain an area for development, although the recently-published Cloud Policy Framework has been positively received by market players

Just over a quarter of surveyed ICT companies express satisfaction with data security, privacy and storage regulations and claim it is not a barrier to conducting business, while the remaining three quarters call for improvements. Furthermore, just under half of surveyed businesses find data protection regulations easy to comply with. These findings suggest that a primary challenge in the ICT regulatory environment revolves around data regulation and compliance.

Multiple sector stakeholders interviewed by the CRA voiced the need for regulatory focus around data center use, data sharing guidelines and cloud policy in particular (Figure 64). This is indicative of the market-wide trend towards cloud services; adoption of cloud is targeted by the CRA's Cloud Policy Framework, published in June 2022 around the same time the survey interviews were taking place. This timing reinforces the regulator's commitment to creating a supportive environment and demonstrates its proactive approach in staying relevant to the sector. Given the expansive nature of data regulation, further developments are sure to come.

**Figure 64. Data Regulations Are A Key Pain Point, Although Recent Regulations Address Industry Concerns (Quotes from Interviews)**

Regulatory focus should shift to cloud policy

— Government stakeholder

There is a need for rules around data centers

— Free zone authority

Opportunities for data sharing regarding health and educational data exist, but the government needs to focus on data sharing rules

— ICT nonprofit organization

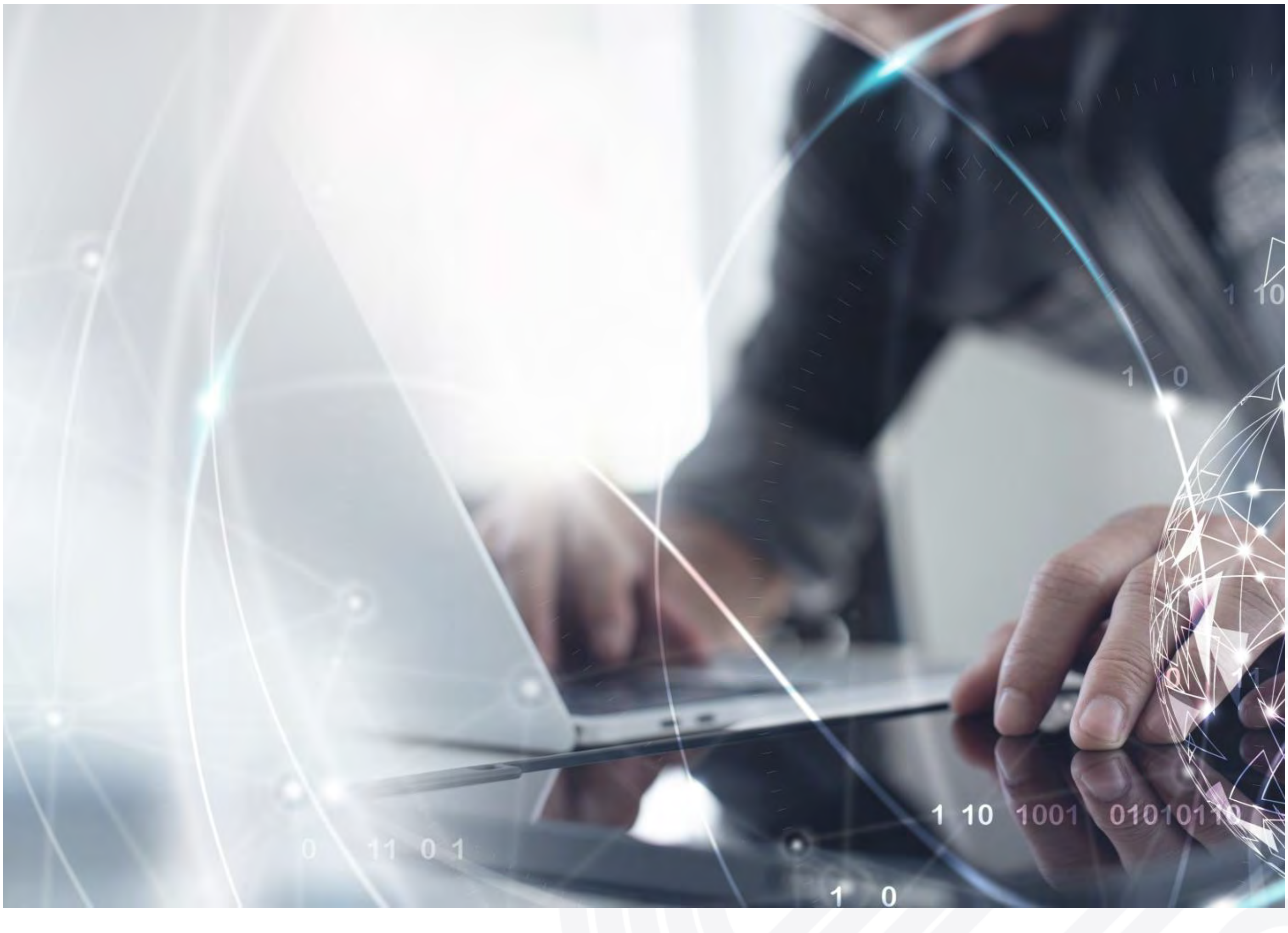
During the phase of interviewing stakeholders, CRA finalized and published the Cloud Policy Framework which effectively addresses many of the captured industry concerns

Source: CRA ICT Sector Survey 2022

# ICT Industry Perceptions of Qatar's Wider Business Environment

## 6 – Just over half of ICT companies finds Qatar's business requirements hassle-free, thus signaling room for better efficiency – but startups and companies that operate internationally tend to have a less positive perception

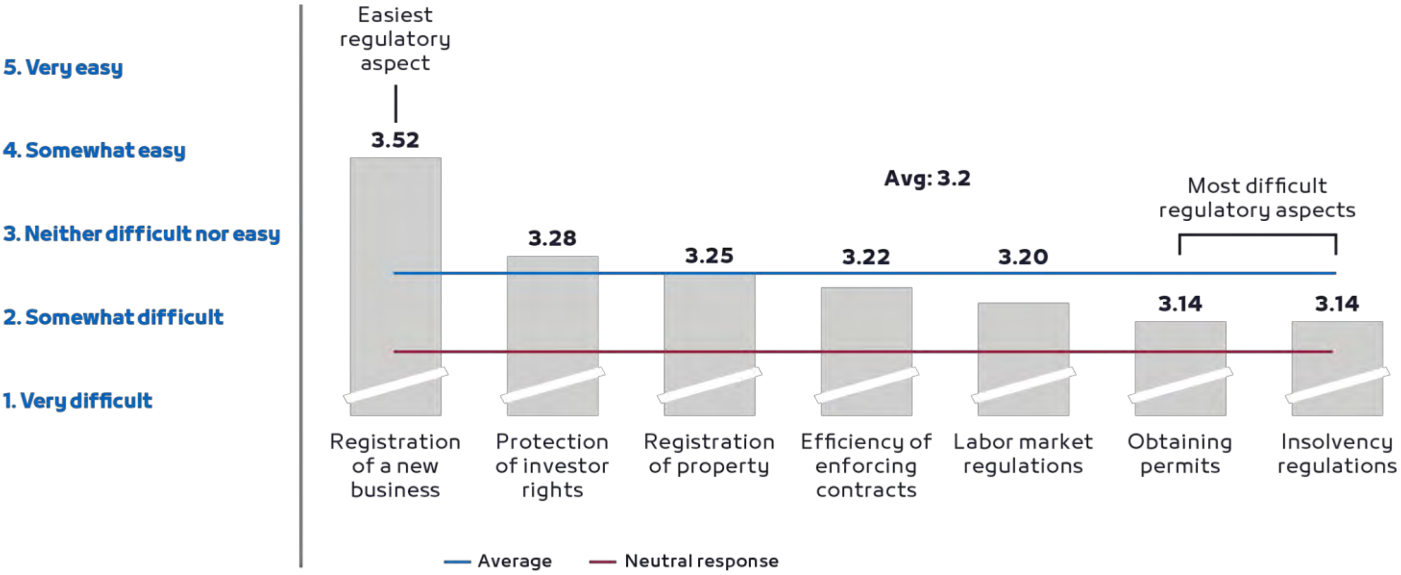
The MOCI Single Window platform has been active for the past three years, bringing major improvements in Qatar's business environment with currently about 70 percent of transactions for business registrations online. Furthermore, the Qatar Financial Centre (QFC), Qatar Free Zones (QFZ), Qatar Science & Technology Park (QSTP) and the emerging Media City (MC) offer streamlined licensing platforms. Based on the CRA ICT Sector Survey 2022, 60% of ICT companies in Qatar find it easy and hassle-free to comply with Qatar's business requirements and processes. Despite this overall positive perception, the remaining 40% do not fully agree: this is particularly true for companies that operate internationally (i.e., serve other markets besides Qatar) and the startup segment. Findings suggest that, despite recent developments like MOCI Single Window, which supports investors in company setup and maintaining their businesses, further enhancements are expected by the industry, particularly when compared to more advanced international jurisdictions.



## 7 – Key challenges affecting ease of doing business for ICT companies in Qatar relate to labor market and visa policies/processes and to obtaining permits and licenses – barriers which could be reduced through enhanced government interoperability and process transparency

The ICT Sector Survey 2022 polled businesses on a variety of regulatory and ease of doing business issues (Figure 65). Registration of new business emerged as the easiest process while obtaining permits and dealing with insolvency regulations were found to be less so.

**Figure 65. Ease of Doing Business Aspects for Qatar ICT Businesses (Average response value on a scale of 1-5)**



n = 362

Source: ICT Sector Survey 2022

Mass survey response has been validated through stakeholder interviews and further analyzed across respondent profiles to determine the most pressing issues present in Qatar's economy-wide regulatory and ease of doing business environment. Overall, labor market regulations, visa processes and the process for obtaining permits or licenses are identified as the most prominent barriers faced by ICT businesses.

**The majority of ICT companies face some challenges with labor market regulations and visa processes which are not fully streamlined and completely transparent**

Only 40% of ICT companies surveyed report positive experiences with labor market regulations. Stakeholder interviews confirm and clarify that this pain point is primarily a result of slow, tedious, and unclear visa processes and persistent visa restrictions, e.g., based on nationality and per establishment quotas. These findings prompt that certain regulations could be a strong barrier to talent acquisition for the ICT sector as they may hinder resolving Qatar's labor shortage, which is a particularly significant problem given the nation's expat-reliant economy. This shortage, which is further highlighted in the "Talent" chapter, is identified as one of Qatar's ICT sector greatest pain points (Figure 66).

Figure 66. Labor Market Regulations Represent a Pain Point to Qatar's ICT Sector

Stakeholder statements regarding the labor market regulations

> Regulations are a pain point as they as they prevent easy access to international talent
>
> – Commercial hub/ecosystem

> It is difficult to bring in outside talent due to the tedious visa process
>
> – Government strategic initiative

> The problem with visas is not that the process is cumbersome, it is that the process is unclear
>
> – Government stakeholder

> Qatar is a small market and bringing talent from abroad is very difficult, especially in terms of visas
>
> – Multinational tech giant

> The process to obtain visas takes a very long time and has a low success rate
>
> – Startup

> Visa programs for entrepreneurs don't exist – incentives like housing, mentorship, incubation, and residency should be provided to attract talent
>
> – Startup incubator

> Visa regulations are difficult because you can't modify nationality, gender, profession, etc. Additionally, using a diploma as proof of profession creates problems for self-taught talent
>
> – Startup

Source: CRA ICT Sector Survey 2022

### Companies' experience in obtaining permits and licensing can be enhanced through increased clarity around processes and greater interoperability between public entities

As seen by the industry, acquiring permits and licenses can be a challenge for ICT businesses in Qata: only 36% of ICT companies find the process to obtain permits easy. The survey finds that companies headquartered outside Qatar seem to have a harder time obtaining permits than those headquartered locally. Taken with stakeholders' comments on government service cohesion (Figure 67), it becomes clear that processes are often not well defined nor transparent, in addition to encountering limited collaboration between government entities. The result is a piecemeal experience for businesses attempting to obtain the necessary permits and licenses.

Figure 67. Stakeholders' Opinions on Government Services (Quotes from Interviews)

**Stakeholder perception of government service cohesion**

There is lack of interoperability between different government entities

— **Government stakeholder**

There is no robust, integrated legal system

— **Commercial hub**

Processes involving regulation are highly political and unclear

— **Multinational tech giant**

Customer experience with government entities is very fragmented; a unified system should be utilized to increase consistency

— **Service provider**

Source: CRA ICT Sector Survey 2022

With increased focus on this topic, one major improvement that has been introduced in the general ecosystem is the MOCI's Single Window platform, with the platform having significantly streamlined business registration and licensing (Figure 68). In fact, registration of a new business was ranked as the easiest regulatory aspect in the ICT Sector Survey 2022. Continued improvements in process clarity and government interoperability will reduce market frictions and improve the local business environment for all companies. Such an effort will also reduce barriers to international companies interested in expanding to Qatar.

Figure 68. MOCI Single Window Platform Streamlines Business Setup Licensing

**70%**

A major improvement in Qatar's business processes is the Ministry of Commerce and Industry's development of a single window platform over the past 3 years. This online interface acts as a one-stop shop for submission and approval of applications for licensing required to establish a business. The platform now enables individuals to complete **70%** of the entire licensing process online through 16 different services. This streamlined system has been positively received by the industry as it reduces both paperwork and processing time.

Source: CRA ICT Sector Survey 2022

## 8 – ICT businesses, particularly local startups and SMEs, believe that the current public procurement practices can represent a barrier to doing business with the government

Results from the CRA ICT Sector Survey 2022 highlight that ICT companies see the public tendering process as a challenge, with the main barriers identified revolving around three core elements: tendering visibility, promotion of local industry, and contractual/financial conditions (Figure 69).

Figure 69. Primary Areas for Improvement in Project Tendering for ICT Companies

| Barrier | Description |
|---|---|
| **Unclarity and complexity of tendering process** | The Government Procurement Portal/Monaqasat provides visibility of open tenders, but often the bidding and selection process remains unclear or opaque especially for SMEs. Some steps of the process might be perceived as complicated by smaller companies (e.g., registration in the portal, suitable document submission). |
| **Approach centered on procuring goods, often unsuitable for service** | The existing tendering approach adopted by public entities (e.g., structure and content of the tendering documents, selection approach, etc.) is most suitable for the procurement of IT goods while it does not necessarily fit best practices in procuring IT services, making it hard for less sophisticated service companies to participate. |
| **Limiting eligibility conditions/selection criteria** | Some eligibility/selection requirements (legal or based on the preferences of procuring entities) such as proof of considerable prior experience and track record, documentation of financial history, availabilities of financial guarantees, make it harder for startups and SMEs to succeed in tenders. |

Source: CRA ICT Sector Survey 2022

These challenges demand attention in order for ICT companies, particularly local startups, and SMEs, to fully leverage their potential and meet public sector demand. With improved visibility of tendered projects and enhanced processes open to a larger circle of businesses, Qatar's public sector can promote the local ICT ecosystem while also getting access to efficient and innovative companies and solutions which are presently struggling to emerge.

Existing public procurement practices have contributed to shaping an ICT ecosystem where smaller, typically local companies tend to conduct less value-adding tasks, while outsourcing core service/product delivery. Large international companies with no legal presence in Qatar often access public procurement deals through local SMEs that act as main contractors in the bid[116]. In principle, partnerships between local and foreign companies, as well as larger businesses and startups to deliver on public tenders can be highly beneficial for the local ecosystem, enabling innovation and knowledge transfer, talent development and market access for smaller businesses. In many cases, however, small local firms that act as main contractors only take on marginal and/or purely administrative roles during project execution, limiting the development of local knowledge and ultimately disincentivizing Qatari businesses' investments in innovation.

> **Smaller firms are usually local. When those firms get a project, they hire subcontractors from outside – large international companies who come to do business, but don't have a local presence.**
>
> — **Qatari business accelerator**

Interviews echoed the opinion that Qatari government entities tend to be risk averse when procuring ICT products and services, and generally prefer well-established and referenced solutions from large international companies over less familiar solutions from smaller providers. This disincentivizes investments in innovative solutions and ET from local businesses, which may therefore be perceived as less marketable in Qatar.

While public procurement regulations and requirements have historically limited the participation of MSMEs, recent amendments to the public tender law[117] introduced provisions aimed at reducing existing barriers by the time of the research study conducted by the CRA. Provisions include the exception from providing bid bonds and performance bonds in some tenders and contracts, exemptions from some tender fees for MSMEs and the incorporation of in-country value (ICV) into the procurement process and assessment. In spite of these recent tender law changes, however, interviewed ICT companies and stakeholders confirm that the public sector's general distrust of new solutions continues to negatively affect innovative local startups' ability to succeed and grow.

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[116] Given the requirement of local presence to be able to bid

[117] Cabinet decision no. 11 of 2022 amending some provisions of Executive Regulations of the Law no. 24 of 2015

> **There is still a long journey to the unicorn because the government cannot stop being the largest customer overnight. The government, unfortunately, is not willing to procure emerging technologies; they go for big brand names. There is a risk averse mentality.**
>
> — **Qatari business accelerator**

[cpu] done / done / password found / operation 129 227
[cpu] negative / negative / [not found] / operation 2249
[cpu] done / negative / error 003
[cpu] error / error / restart
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[cpu] negative / analyzing / operation 552 390
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# Investment and Funding

## KEY FINDINGS

**Investment**

**01**

Around two-thirds of all surveyed ICT businesses, regardless of geographic scope and maturity, expect to increase their investments in Qatar within the next 3-5 years

**02**

FDI CapEx inflows to Qatar’s ICT sector have grown substantially in recent years and represent a greater proportion of total FDI CapEx inflows than in peer countries

**03**

Ooredoo Qatar and Vodafone Qatar have invested heavily in Qatar’s telecom sector with annual CapEx exceeding QAR 1bn since 2017, while additional market investments in data center capacity, cloud infrastructure and development of digital services are key to further augment the ICT sector and digital economy

**04**

Based on the survey, the majority of Qatar’s ICT businesses tends to direct investments towards serving customers rather than improving their offerings or innovation

**Funding**

**05**

Areas for development exist within the general funding ecosystem, particularly around availability of startup financing

**06**

ICT companies tend to finance their businesses mainly through cash flow and retained earnings followed by commercial business loans and credit lines, as well as by equity investments from private individuals

**07**

SMEs find it difficult to access commercial loans from banks thus limiting their options for growth capital

**08**

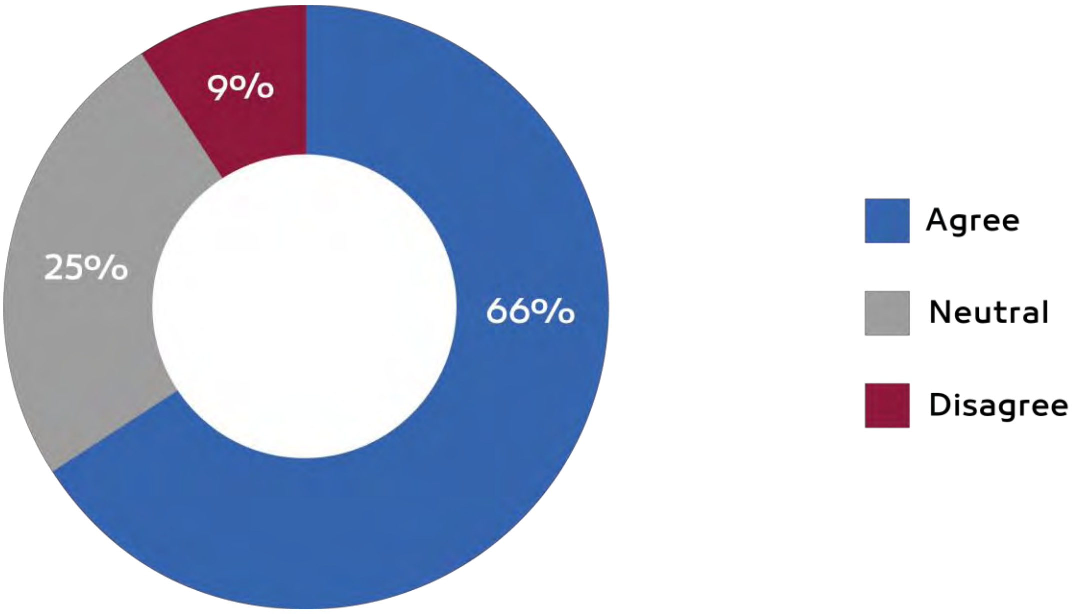
ICT startups do not heavily leverage Venture Capital (VC) as the local VC market is not fully developed

## Investment

### 1 – Around two-thirds of all surveyed ICT businesses, regardless of geographic scope and maturity, expect to increase their investments in Qatar within the next 3-5 years

The ICT Sector Survey 2022 results show an encouraging 66% of companies planning to increase their IT business investments in Qatar over the next three to five years (Figure 70). Significant examples of recent and planned investments by large multinationals, which will drive further investment, include Microsoft's opening of a global data center in Qatar and Google's launch of a regional cloud hub.

**Figure 70. Expectations of Investment for ICT Businesses Over the Next 3-5 Years (% of responses)**

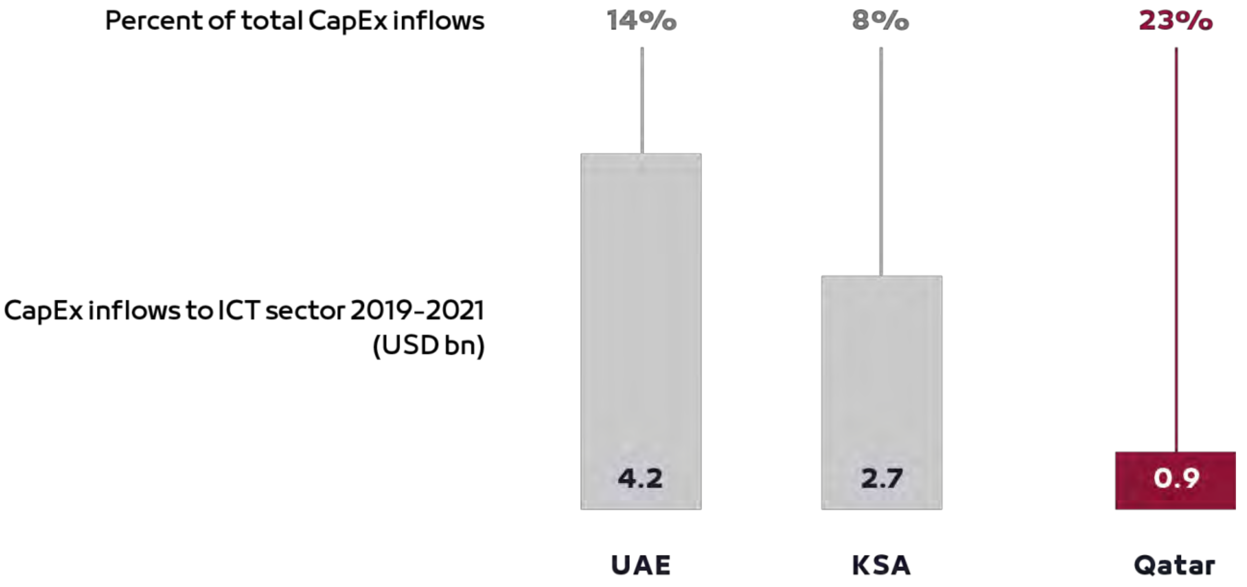


n = 362
Source: ICT Sector Survey 2022

### 2 – FDI CapEx inflows to Qatar's ICT sector have grown substantially in recent years and represent a greater proportion of total FDI CapEx inflows than in peer countries

The survey's positive response on investment finding perspective for Qatar's ICT sector is supported by data illustrating strong foreign direct investment inflows targeting ICT CapEx between 2019 and 2021. Qatar's ICT sector CapEx inflows total around USD 900mn, almost 75% of which is focused on the communications and electronic components segments. Although 20-30% lower in absolute value than the UAE and KSA, Qatar's ICT CapEx inflows are substantially higher as a share of the total (Figure 71). Furthermore, FDI inflows targeting ICT CapEx have increased by over 130% in both the 2016-2018 and 2019-2021 periods, in line with the growth in FDI CapEx inflows across Qatar's economy. This indicates the growing importance of Qatar's ICT sector to both domestic and international stakeholders.

Figure 71. FDI Inflows Directed to ICT Sector CapEx (Qatar and GCC Peers)



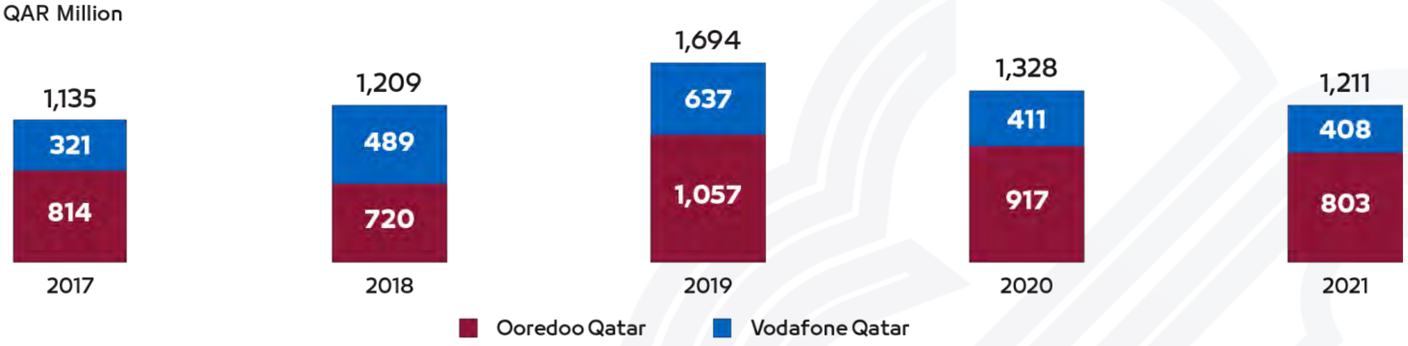
Source: Financial Times Ltd 2022[118]

## 3 – Ooredoo Qatar and Vodafone Qatar have invested heavily in Qatar's telecom sector with annual CapEx exceeding QAR 1bn since 2017, while additional market investments in data center capacity, cloud infrastructure and development of digital services are key to further augment the ICT sector and digital economy

Beyond FDIs, companies in Qatar are also investing significant resources in ICT CapEx. Ooredoo Qatar and Vodafone Qatar have collectively contributed over QAR 1bn per year towards capital expenses (Figure 72). These investments enable maintaining and upgrading Qatar's highly successful telecom infrastructure (see Infrastructure chapter) and represent the telecom sector's commitment to investing in the nation's current needs and future goals.

Moving forward, further market investments in data center capacity, cloud infrastructure and development of digital services are key to the sustainable growth of the ICT sector and digital economy.

Figure 72. Annual CapEx In Excess of QAR 1bn for Qatar's Telecom Sector Since 2017 (CapEx, QAR mn)



Source: CRA Qatar Telecommunications Market Report Q4 2021

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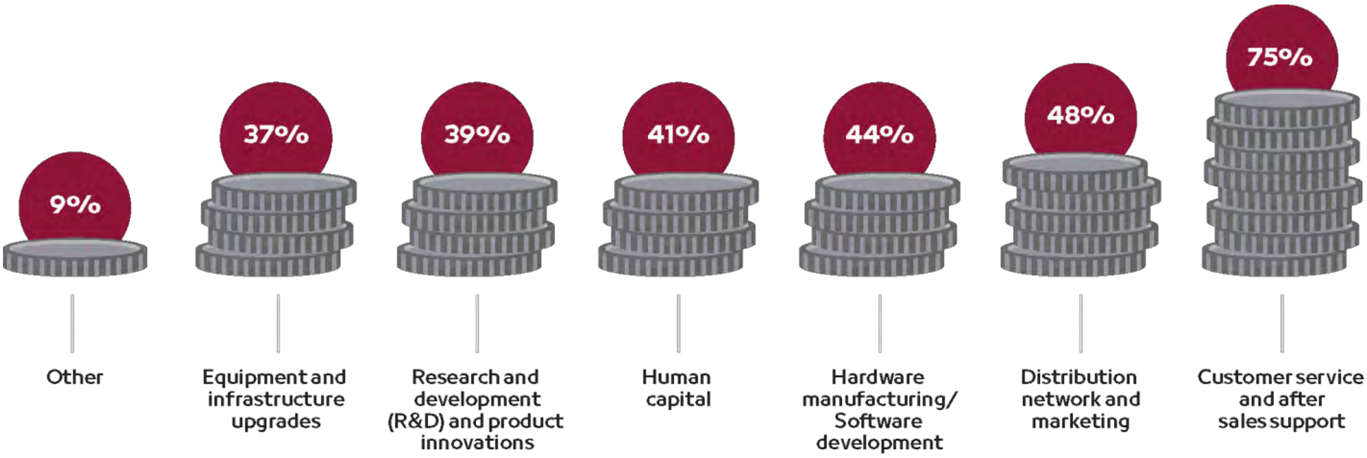
[118] Includes FDI related to software & IT services, communications, electronic components, consumer electronics, and semiconductors

## 4 – Based on the survey, the majority of Qatar's ICT businesses tends to direct investments towards serving customers rather than improving their offerings or innovation

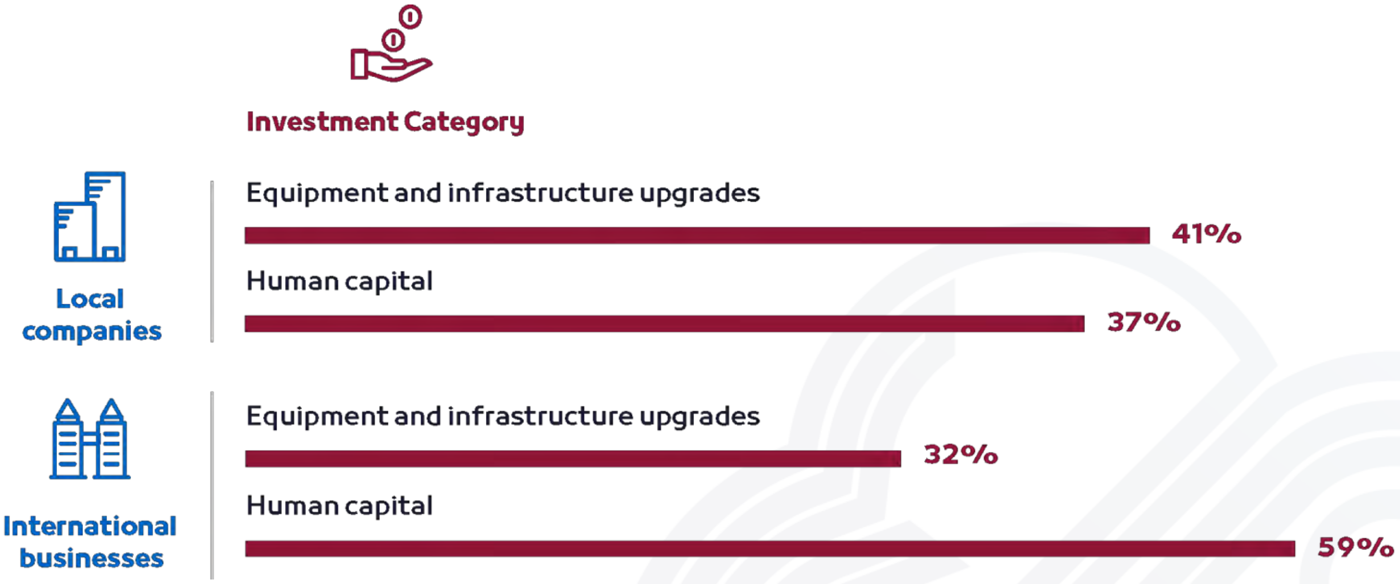
**Figure 73. Areas for Current or Near-Future Investments for ICT Companies (% of responses)**



n = 362
Source: CRA ICT Sector Survey 2022

Based on the survey, Qatar's ICT industry tends to direct investment more towards serving customers rather than improving their product and service offerings or innovation. The "customer service and after sales support" category receives clear priority for investment by 75% of survey respondents (Figure 73), followed by distribution and marketing (48%). Just over one third of surveyed businesses orient spending toward R&D and product innovations.

**Figure 74. Investment Categories Targeted by ICT Companies for Current or Near-Future Investments (% of responses)**



n = 362
Source: CRA ICT Sector Survey 2022

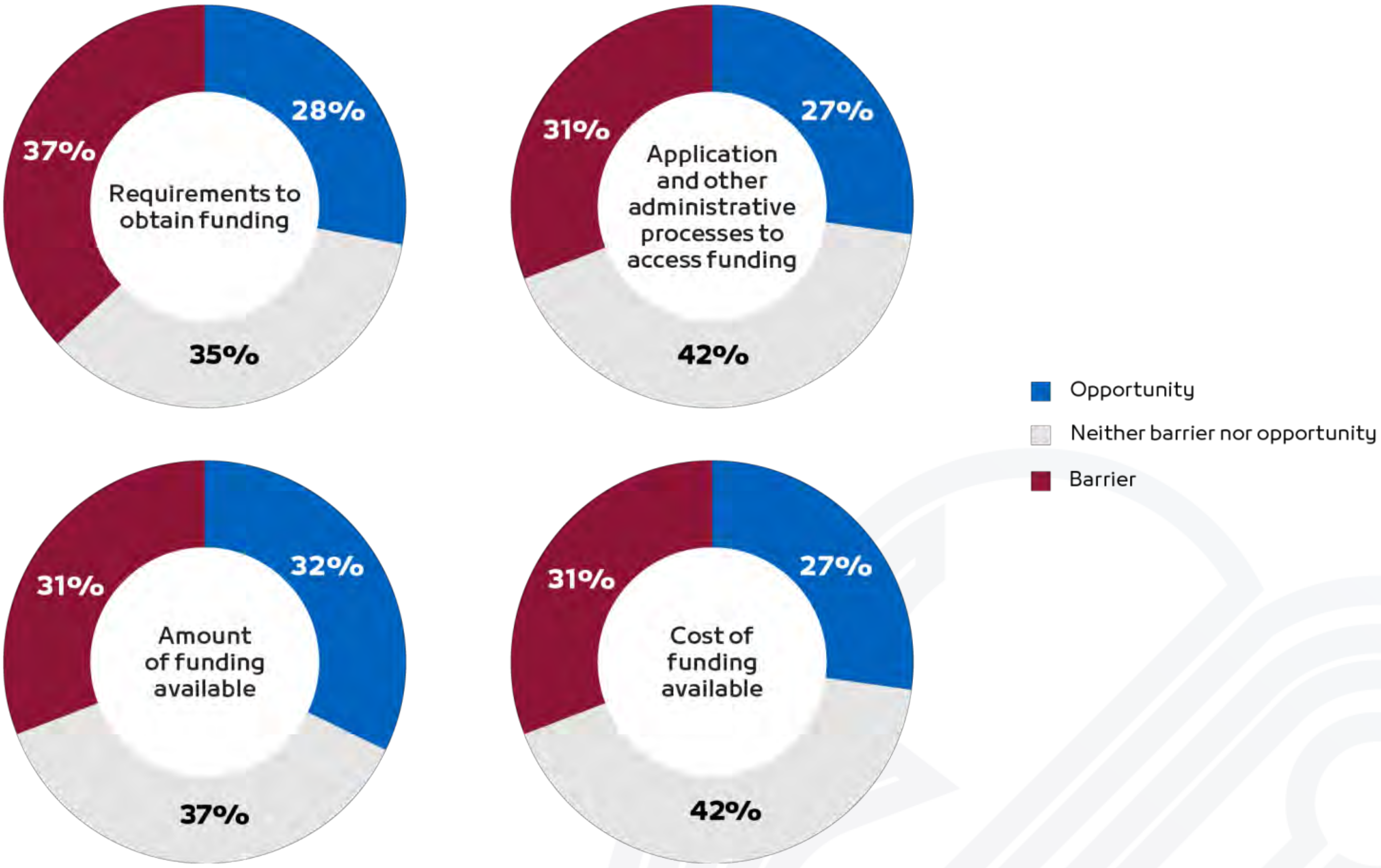
Segmenting based on geographic scope (Figure 74) reveals that around one third of the companies that operate locally are investing in human capital compared to almost 60% of those operating internationally. Local companies, however, are more interested in investing in "equipment and infrastructure upgrades". Based on these findings and considering Qatar's significant ICT talent gap, the government should seek ways to incentivize more private sector investment in talent and human capital development.

## Funding

### 5 – Areas for development exist within the general funding ecosystem, particularly around availability of startup financing

As the survey has strongly signaled through quantitative findings and interviews across the industry, Qatar's ecosystem can improve in the amount, cost and accessibility of funding. One third of respondents identified these factors as barriers to conducting business, and the majority are not fully satisfied with the current situation (See Figure 75); startups are the segment most prone to adverse experiences with the funding ecosystem. Cumulatively, these findings suggest that funding for the ICT sector is not yet sufficient, affordable or accessible.

Figure 75. ICT Companies' Perception of Funding Aspects (% of responses)

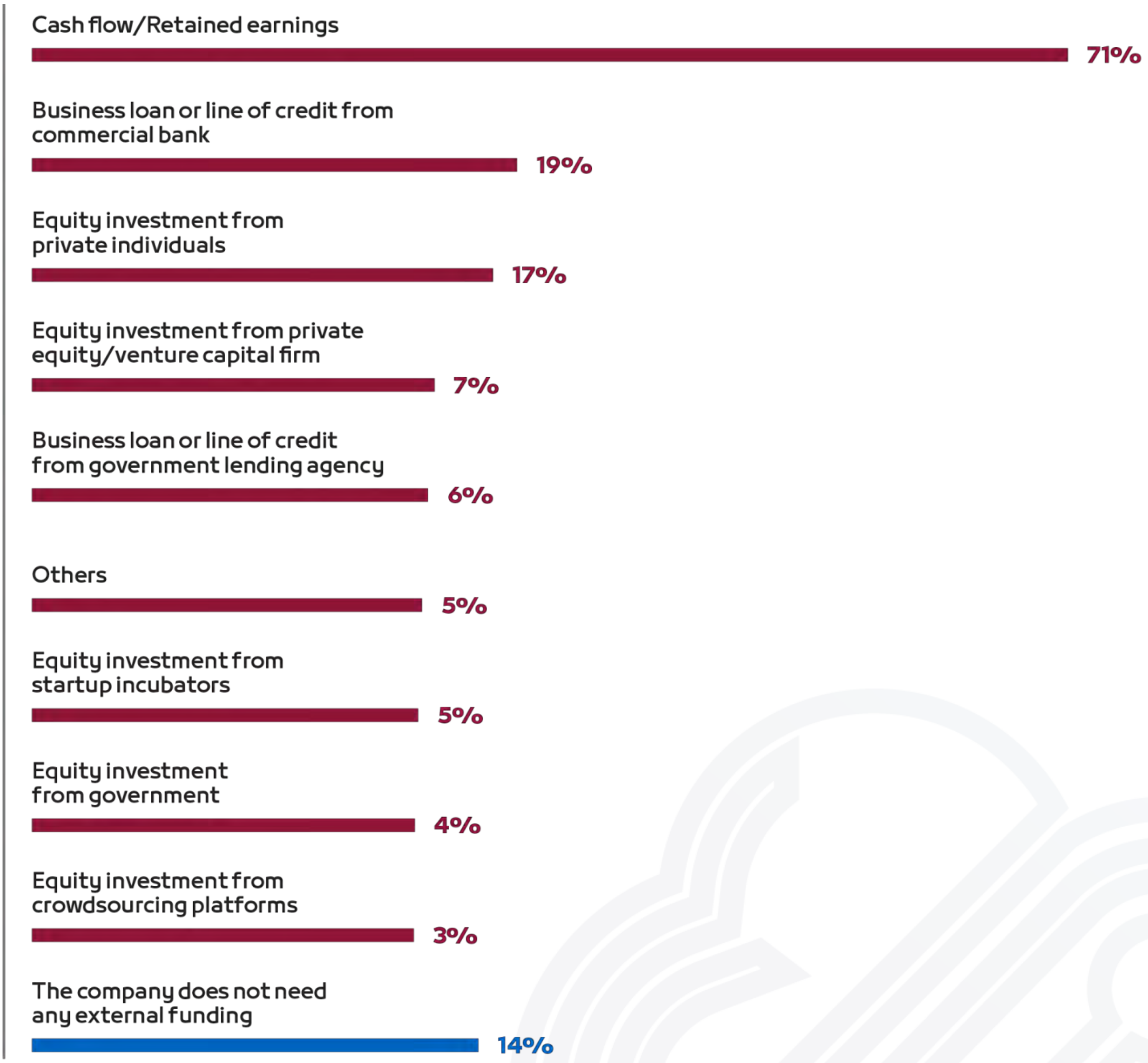


n = 313-320
Source: CRA ICT Sector Survey 2022

## 6 – ICT companies tend to finance their businesses mainly through cash flow and retained earnings followed by commercial business loans and credit lines, as well as by equity investments from private individuals

Based on the survey, ICT companies in Qatar have identified three dominant sources of current funding for their businesses: cash flow and retained earnings, business loans or credit lines from commercial banks, and equity investment from private individuals (Figure 76). According to the survey data, institutional investment appears as being more limited in availability or far less attractive in Qatar.

**Figure 76. Types of Funding Sought by ICT Companies to Finance Business and Operations (% of responses)**



n = 362

Source: CRA ICT Sector Survey 2022

Internationally operating companies[119] typically have more diversified sources of funding and leverage proportionally more equity investment and commercial bank financing than entirely local operators (Figure 77). This may reflect international companies having better access to funding outside of Qatar.

**Figure 77. Use of Funding Sources for ICT Companies (% of responses by geographical type)**

| Funding Source | International | Local | Difference |
|---|---|---|---|
| Cash flow/Retained earnings | 71% | 71% | = |
| Equity investment from private individuals | 24% | 14% | 10 p.p. |
| Business loan or line of credit from commercial banks | 19% | 19% | = |
| The company does not need any external funding | 15% | 13% | 2 p.p. |
| Equity investment from private equity/venture capital firm | 14% | 4% | 10 p.p. |
| Business loan or line of credit from government lending agency | 11% | 4% | 7 p.p. |
| Alternate sources | Less than 10% in each segment | | |

n = 362
Source: CRA ICT Sector Survey 2022

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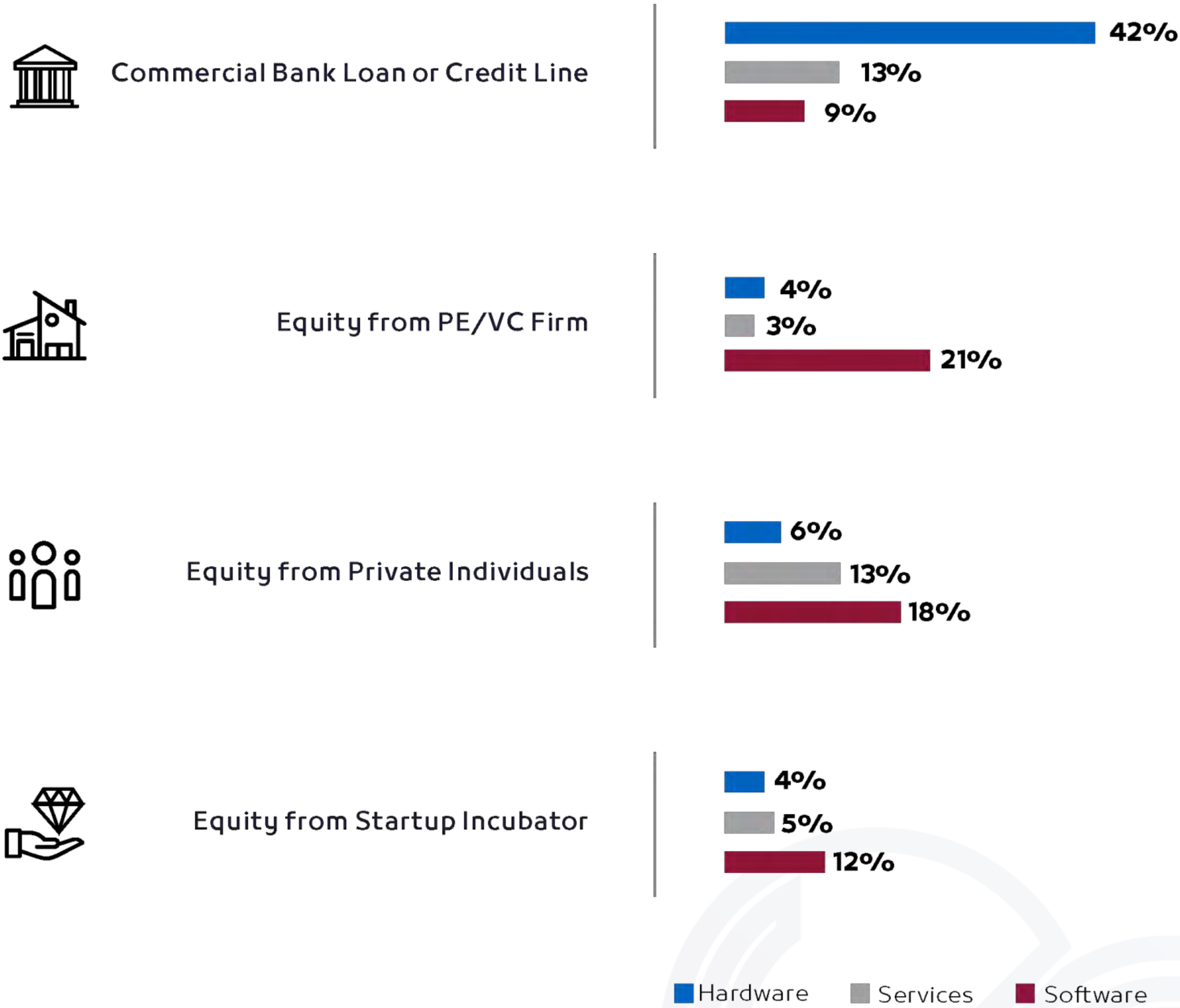
[119] i.e., companies headquartered in Qatar or abroad that serve other markets in addition to Qatar

Segmenting responses by non-diversified companies' activity[120] suggests that hardware businesses rely significantly more on loans while software companies lean more toward equity investments (Figure 78). These findings could be driven by differences in company maturity, business characteristics or availability of financing – or a potential combination of all three characteristics.

**Figure 78. Variations in Funding Sources for Companies Involved Exclusively in Hardware, Services or Software (% of responses)**



n = 121
Source: ICT Sector Survey 2022

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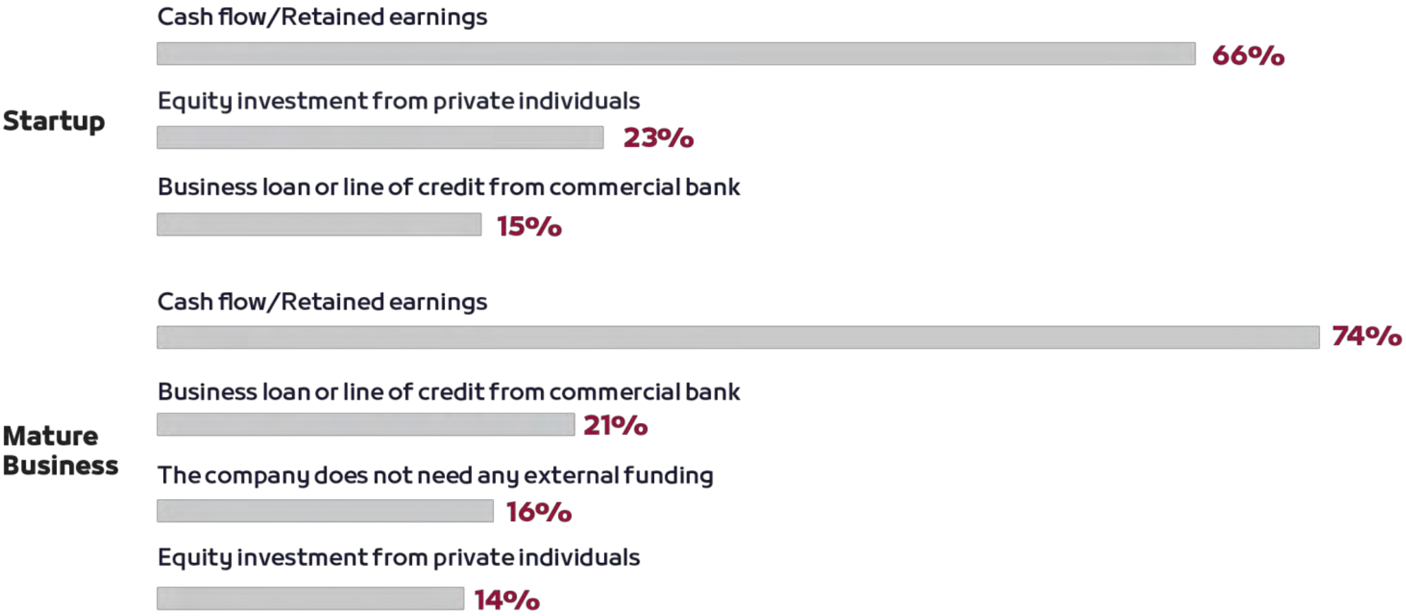
[120] Segmenting by companies operating exclusive activity (i.e., hardware, services or software)

## 7 – SMEs find it difficult to access commercial loans from banks thus limiting their options for growth capital

It is evident that both startups and mature companies rely heavily upon cash flow and retained earnings, while the survey also indicates that many companies, especially startups, are not utilizing growth capital for expansion (Figure 79). Startups' limited access to loans (15%) reflects interview feedback that startups and SMEs face significant difficulty in accessing commercial bank financing in Qatar due to stringent policies. Some government programs exist to ease access to funding for SMEs, for example within the activities promoted by Qatar Development Bank (QDB). However, further targeted action is required in this aspect.

Figure 79. Top 3 Sources of Funding Used to Finance IT Business and Operations (% of responses by company maturity)



n = 355
Source: CRA ICT Sector Survey 2022

> The main issues SMEs and startups have is with the banking sector: banks are still requiring them to make significant deposits and have residency in order to start doing business. This makes it very difficult and costly for startups to use Qatar as an IT hub to pitch for business. Furthermore, many SMEs have problems acquiring loans here and it is hard to grow if they can't get additional funding.
>
> — Economic entity

## 8 – ICT startups do not heavily leverage Venture Capital (VC) as the local VC market is not fully developed

Startup financing emerges as a main area of enhancement in Qatar's funding landscape. Stakeholder interviews highlight the primary need for additional venture capital (Figure 80), and this is backed by the quantitative survey finding that only 9% of startups report using equity funding from VC/PE and incubators.

Figure 80. ICT Stakeholders Perceive a Significant Need for VC Funding for Startups

> There are hardly any VC and angel investors in Qatar, they are all in Dubai.
>
> **– Economic entity**

> Biggest pain is lack of VC; people who have money don't have appetite for risk.
>
> **– Startup**

> There are no diverse VC platforms... Additionally, there is a gap in equity funding after Series A investments.
>
> **– Financial institution**

> Startups struggle with funding in Qatar. Most of the funding comes from the government and there is lack of VC funding.
>
> **– Qatari innovation platform**

Source: CRA ICT Sector Survey 2022

Low levels of VC funding amongst ICT startups, further illustrated through interviews with startup founders, highlight the nascency of Qatar's VC scene. In fact, Qatar's VC investments in 2021 totaled just QAR 69mn across 24 deals, with the bulk of these going to transport & logistics, fintech and the food & beverage sectors[121]. This indicates that, beyond fintech, ICT is not a primary target area for VC funding in Qatar. Furthermore, Qatar's VC market accounts for a mere 1% of 2021 VC funding in the MENA region[122]. The infancy of the VC scene is both linked to funding availability and to the availability of attractive target startups. As Qatar continues to diversify its economy and seeks to foster its ICT sector, it is imperative to prioritize and create VC investment opportunities that support localized innovation and secure economic growth. For more on Qatar's VC landscape, additional details can be found in the "R&D and Innovation" chapter.

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[121] QDB, MAGNiTT, Qatar Venture Investment Report 2021, https://www.qdb.qa/en/Documents/Qatar%202021%20Venture%20Capital%20Report_English.pdf

[122] MAGNiTT, MENA 2022 Venture Investment Report, https://magnitt.com/research/mena-2022-venture-investment-report-50797 –

# Talent

## KEY FINDINGS

### Snapshot of Current ICT Employment

**01** Labor force share in information and communications in Qatar lags behind both the UAE and OECD countries, in line with the smaller GDP contribution of the sector

**02** More than 85% of employees in ICT are non-Qatari nationals, while the share of Qatari nationals in the ICT workforce is in line with other service sectors such as financial services, insurance, education and health

**03** Gender diversity can be improved as males continue to represent 83% of the total ICT workforce, a higher share than in other service sectors

### Demand for Talent

**04** More than 60% of ICT companies have plans to hire in order to cover staff gaps or expand

**05** 64% of companies with existing staffing gaps find it difficult to hire

**06** Software development, cybersecurity and data analytics skills are in high demand for the ICT sector

### Supply of Talent

**07** Junior local talent is available and can cover part of the demand, but will continue to be complemented by a large share of foreign expertise

**08** Employers have a mixed perception of Qatar's local workforce quality: room for improvement exists, as ICT capacity building and upskilling programs start to emerge

**09** Employing Qatari nationals remains costly, driven by generous employment conditions in the government and quasi-government sectors

**10** Qatar faces increased competition for talent due to the global gap, but it can enhance its positioning by further improving quality of life and immigration requirements/processes, and by creating an ICT ecosystem that offers attractive professional growth opportunities for talent

## Snapshot of Current ICT Employment

### 1 – Labor force share in information and communications in Qatar lags behind both the UAE and OECD countries, in line with the smaller GDP contribution of the sector

Based on data from the Planning and Statistics Authority, only 1% of Qatar's total labor force is employed in the information and communications sector. Although growing from 0.8% in 2016, this share remains low when compared to the regional ICT leader, the UAE (3%), with this low share reflective of the current small contribution of the industry to the national GDP (Figure 81).

Figure 81. ICT Sector Labor Force Share and Contribution to GDP[123]

| | QATAR | UAE | OECD |
|---|---|---|---|
| **Share of Labor Force** | **~ 1.0 %** | ~ 3.0 % | ~ 7.0 % |
| **Sector Contribution to Non-Hydrocarbon GDP** | **2.7 %** | 4.4 % | > 4.3 % |

Sources: PSA Labor Force Survey 2020, World Bank, OECD, Oxford Economics

### 2 – More than 85% of employees in ICT are non-Qatari nationals, while the share of Qatari nationals in the ICT workforce is in line with other service sectors such as financial services, insurance, education and health

In 2020, 85% of the workforce employed in the information and communications sector (ISIC Section J) was non-Qatari[124], representing a slight increase from 81% in 2016. The share of Qatari nationals in the information and communications workforce, at 15% in 2020, is in line with the share observed in other service sectors with the highest proportion of nationals after public administration: financial services, insurance, education and health (Figure 82). These sectors, as well as the information and communications industry, include large quasi-government companies and national champions such as Ooredoo, Al Jazeera, BeIN, QNB and the Qatar Foundation.

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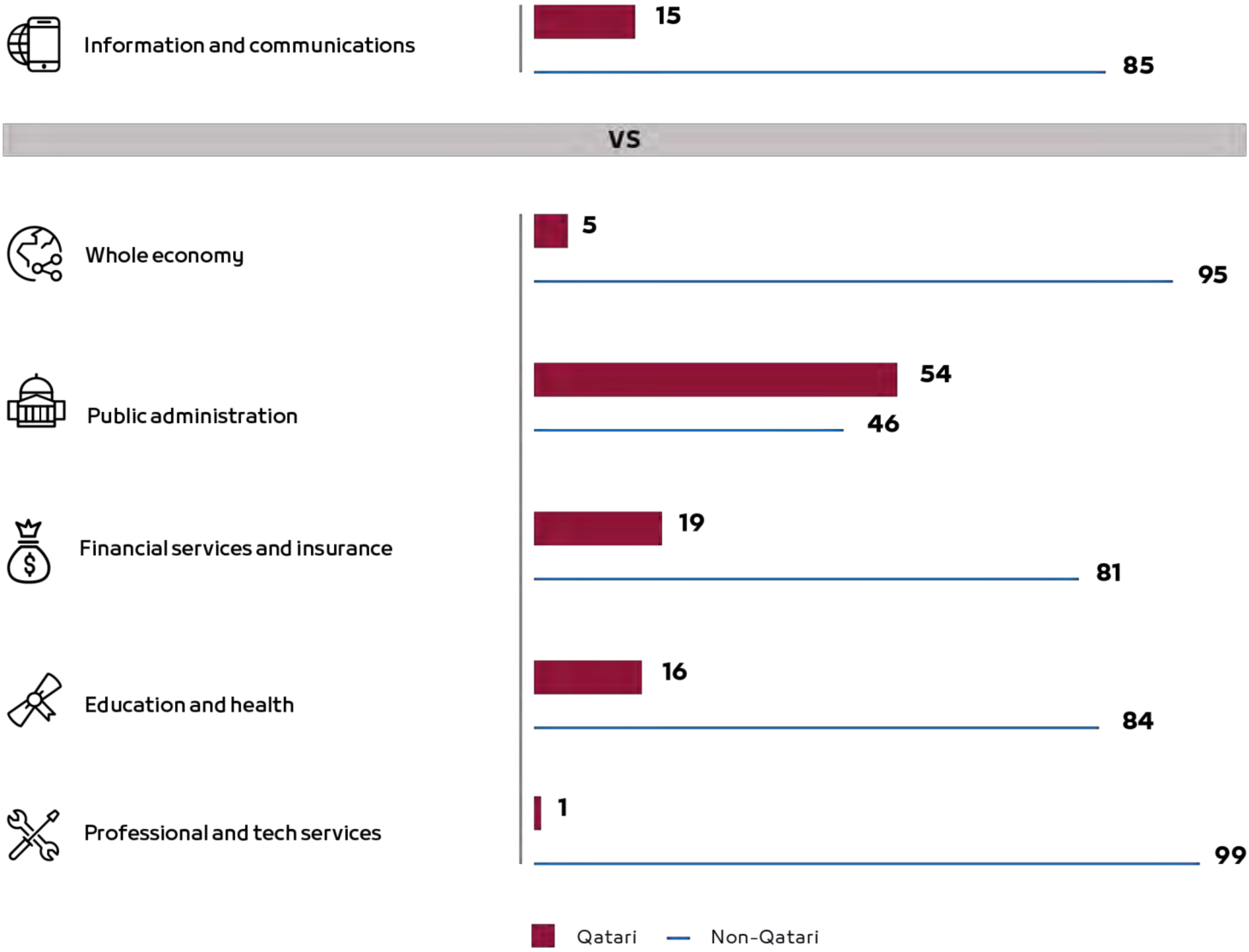
[123] Sector contribution to GDP data as of 2021; total real GDP for OECD (minimum observed among the countries), non-hydrocarbon real GDP for Qatar and the UAE; Qatar employment data refer to year 2020 (latest available, given the similar GDP contribution of the sector in 2020 and 2021 the sector's workforce contribution should also be similar)

[124] PSA - Labor Force Sample Survey, 2020; ICT data refer to ISIC Section J as closest proxy measure for the sector

Figure 82. Workforce Composition by Nationality (2020) (% of sector employment)



Source: PSA Labor Force Survey 2020

The CRA ICT Sector Survey 2022 suggests that the share of foreign labor in the ICT sector might be even higher: 85% of surveyed companies estimate expats to represent more than 90% of their employees, and more than half of the companies suggest that they only employ non-Qatari nationals. The share of foreigners seems to be higher in large companies, however it is less likely that these companies exclusively employ expats.

Figure 83. Share of Companies Employing a Vast Majority of Expats (% of respondents)

| | Total companies | Large companies | Medium companies | Micro/Small companies |
|---|---|---|---|---|
| **More than 90% expats** | 85% | 94% | 80% | 85% |
| **100% expats** | 62% | 44% | 50% | 65% |

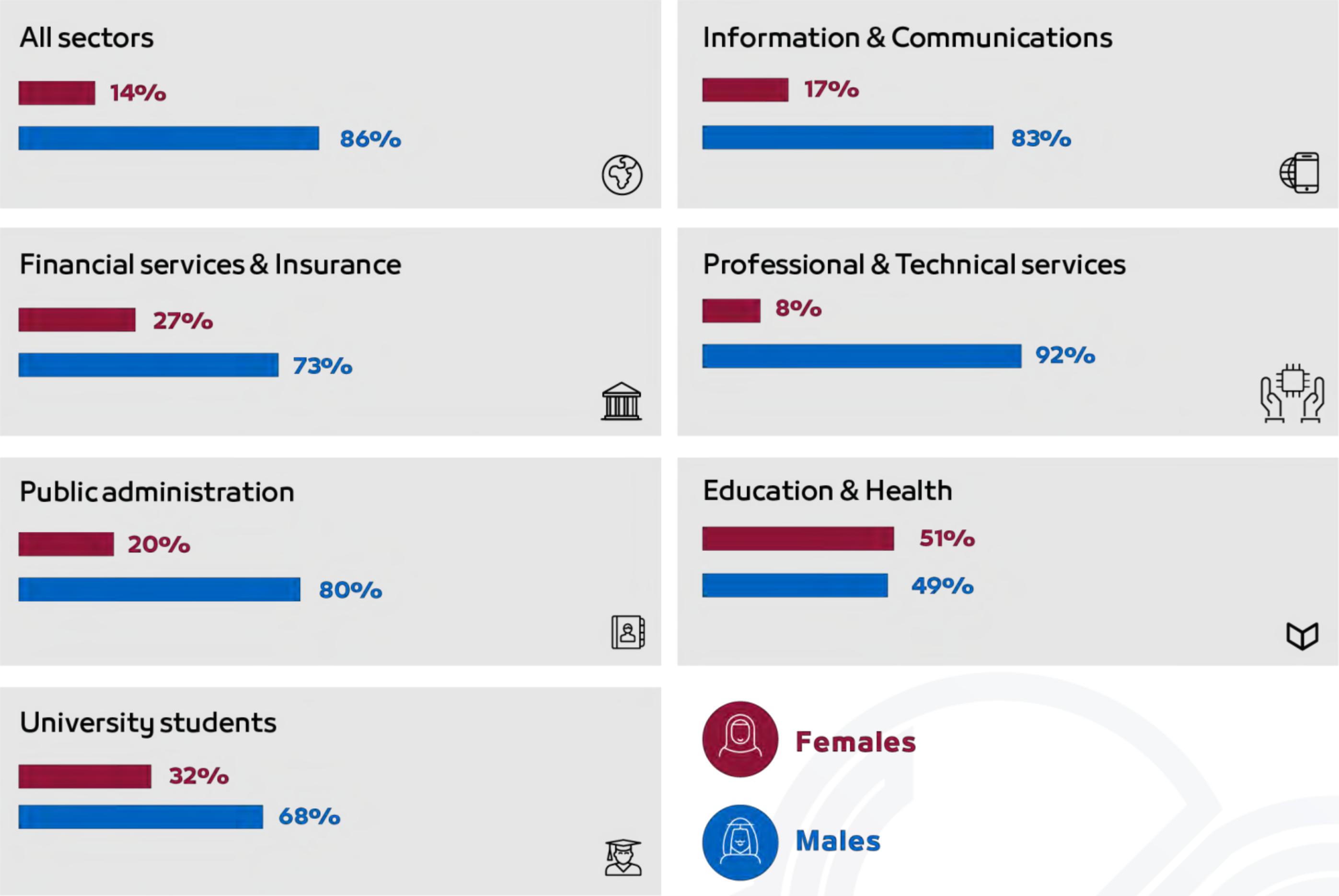
n = 362
Source: CRA ICT Sector Survey 2022

## 3 – Gender diversity can be improved as males continue to represent 83% of the total ICT workforce, a higher share than in other service sectors

Females represented 17% of the information and communications workforce in Qatar, a share that has remained relatively constant over the past years. The sector performs better than the overall economy in terms of female employment (14% in 2020)[125], but lags behind other service sectors such as financial services, education and health. The share of females in information and communications is also considerably lower than the proportion of female students in universities in Qatar[126] (figure 84), suggesting that there is room to enhance diversity in the sector with known positive impact on the industry's performance[127].

Diversity can be also improved for Qatari nationals specifically: only 38% of the Qatari employees in information and communications are females compared to, as a reference, 54% in financial services sector[128,129].

**Figure 84. Workforce Composition Across Sectors in Qatar by Gender (2020) (% of sector employment)**



Source: PSA Labor Force Survey 2020

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[125] PSA - Labor Source Sample Survey, 2020, https://www.psa.gov.qa/en/statistics/Statistical%20Releases/Social/LaborForce/2020/statistical_analysis_labor_force_2020_EN.pdf

[126] Education in Qatar Statistical Profile 2019 (2017/2018 data on number of students by gender is used)

[127] Bigger boost to growth and higher productivity than increasing the male labor force only (IMF)

[128] PSA - Labor Source Sample Survey, 2020

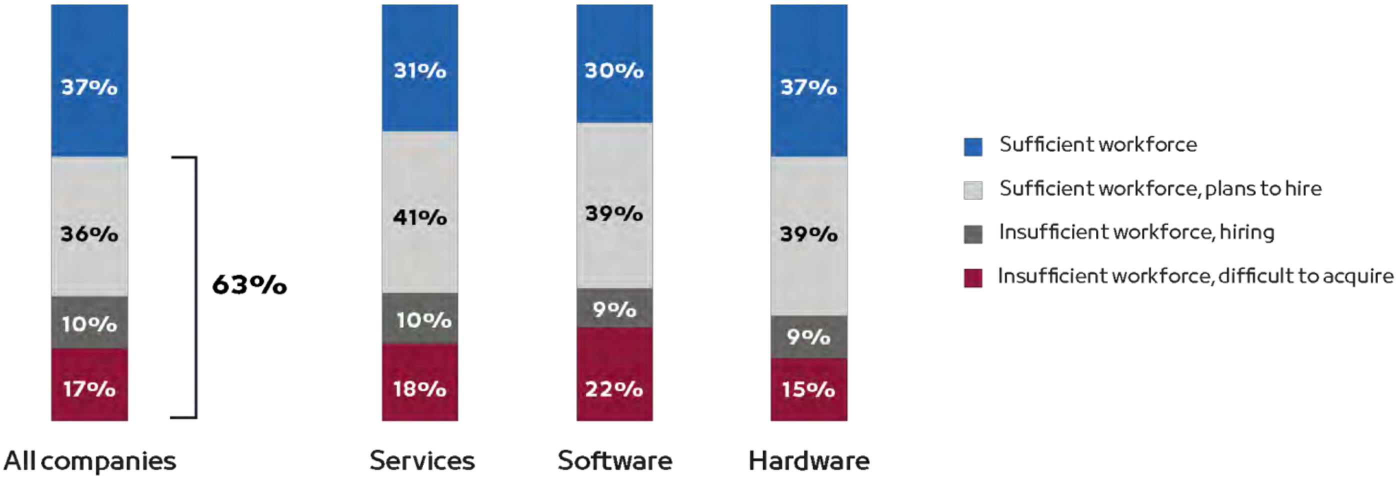
[129] Financial services and information and communications have a similar number of total employees and a similar share of Qatari nationals

## Demand for Talent

### 4 – More than 60% of ICT companies have plans to hire in order to cover staff gaps or expand

63 percent of ICT companies surveyed are planning to expand their staff in the near future, either to cover current shortages or to enable expansion plans. Propensity to hire is higher for respondents in the ICT services and software segments (Figure 85).

Figure 85. Overview of Staffing of ICT Companies in Qatar (2022) (% of respondents)



n = 362
Source: CRA ICT Sector Survey 2022

> Talent attraction is a multifactor strategy; it depends on where you are in the maturity cycle as an enterprise. For example, when you start, you need to recruit experienced people who can help you build and execute strategies. More mature organizations start recruiting local talent who are sometimes less experienced, such as university graduates.
>
> — **Qatari innovations accelerator**

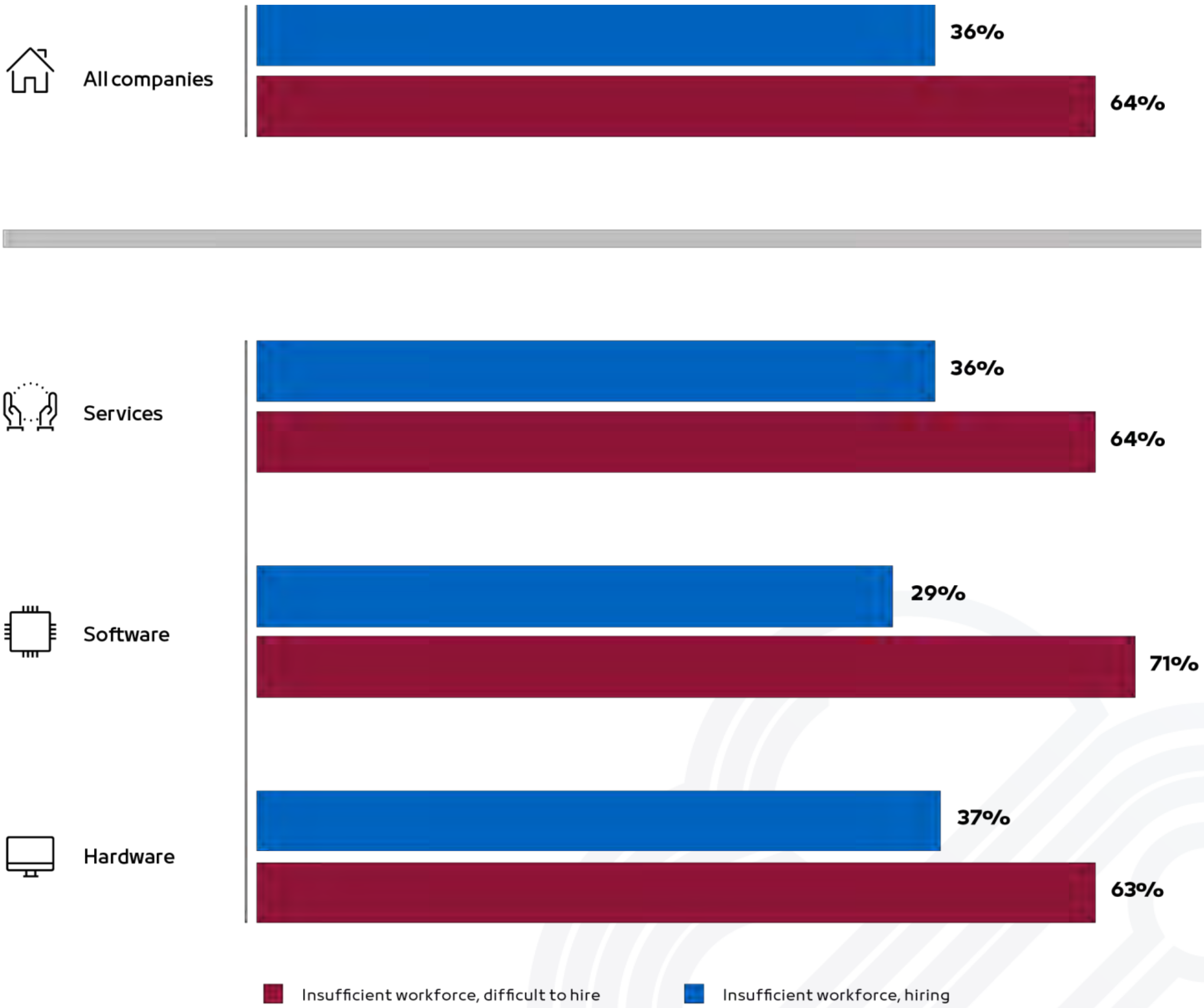
Companies are looking for both junior-level profiles (i.e., graduates from local universities) as well as experienced professionals. Multiple companies interviewed by the CRA shared the opinion that local graduate talent can be found. As much as new graduates are available locally, they are also seen to need the support of senior colleagues for knowledge transfer and capability building. Many respondents noted that they are already hiring and training local graduates.

Company maturity seems to be an important factor affecting hiring profiles: startups generally prefer more experienced professionals, ideally with an international background, and are less likely to employ local graduates. Some stakeholders shared a concern that the limited size of Qatar's market might mean it is unable to absorb top emerging talent, both expat and national, who then leave the country rather than join the local market.

## 5 – 64% of companies with existing staffing gaps find it difficult to hire

Overall, 64% of the surveyed companies trying to hire to cover existing staffing gaps encounter difficulties in doing so (Figure 86). Hiring seems particularly challenging for software companies: 71% of those looking to cover staffing gaps face hiring complications.

**Figure 86. Overview of Staffing of ICT Companies with Existing Gaps (2022)**
**(% of respondents by type of business activity)**



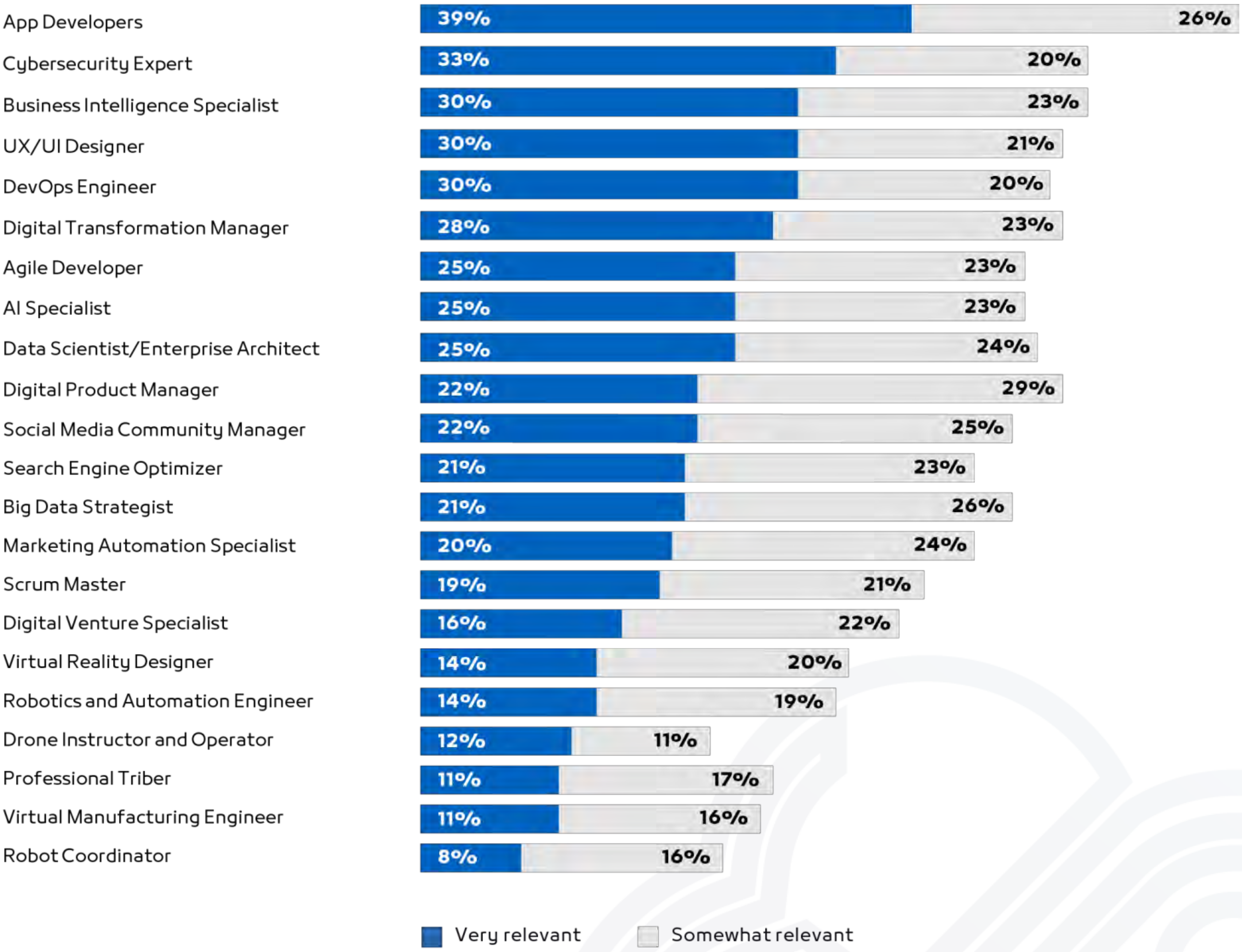
Source: CRA ICT Sector Survey 2022

## 6 – Software development, cybersecurity and data analytics skills are in high demand for the ICT sector

Based on the CRA ICT Sector Survey 2022, ICT companies in Qatar consider software developers, cybersecurity experts and data analysts most relevant for their business needs (Figure 87). This is true for companies experiencing difficulties in hiring and those that do not, suggesting that hiring problems are not linked to niche profiles but are a more general and wide-ranging issue.

Input from external sources confirm these findings: for example, the *2021 14 Best Technology Jobs of the Future* list compiled by Indeed.com, a worldwide employment website, includes the three top professions emerging from the CRA survey. IT Career Finder's list of the top 10 best computer jobs for the future include IT security, software development and data scientists[130].

**Figure 87. Ranking of ICT Professions Relevance by ICT Companies in Qatar (% of respondents)**



n = 362
Source: CRA ICT Sector Survey 2022

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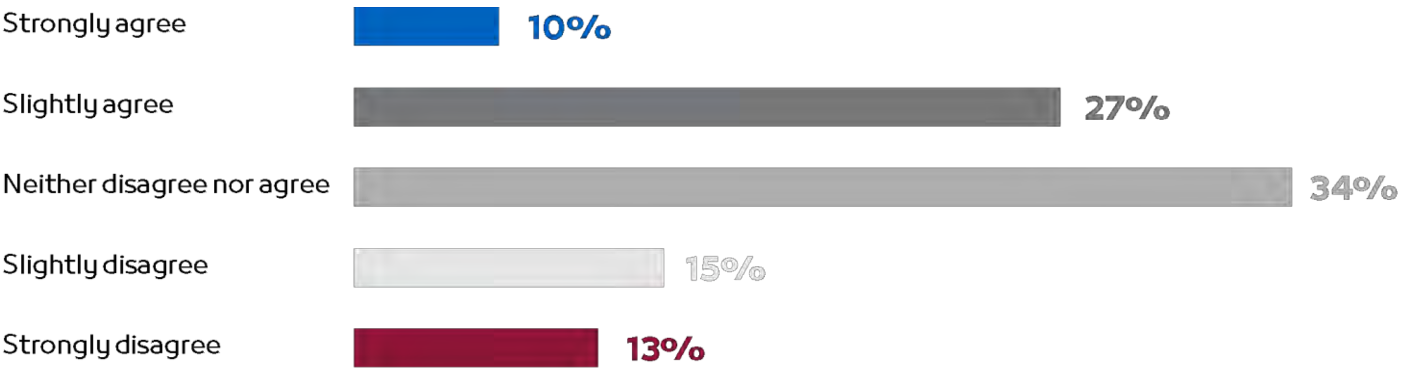
[130] 2022 rating based on a mix of forecasts of salary and employment growth

## Supply of Talent

### 7 – Junior local talent is available and can cover part of the demand, but will continue to be complemented by a large share of foreign expertise

The CRA ICT Sector Survey 2022, through the standard survey and interviews with industry representatives, suggests that companies can meet part of their talent needs through local hires: 37 percent of respondents agree that local ICT talent is available and abundant, while 63 percent either disagree or are unsure of their perception (Figure 88).

Figure 88. ICT companies' responses to the statement that the local ICT talent is available (% of respondents)



Source: CRA ICT Sector Survey 2022

Several Qatar-based universities have introduced relevant undergraduate programs; for example, Qatar University offers Computer Science and Engineering degrees which are also featured in The Times' Higher Education Rating 2022, and Qatar University as a whole was ranked 201-250 out of more than 1,600 universities in The Times's Higher Education Ranking 2023 and 95th for Computer Science[131]. Carnegie Mellon University in Qatar offers its world-renowned Bachelor of Science in Computer Science and a Bachelor of Science in Information Systems at its local campus, while Texas A&M University in Qatar grants a Bachelor's degree in Electrical Engineering. Additionally, the University of Doha for Science and Technology was established in 2022 as the first national applied university. Apart from Qatar University, Hamad Bin Khalifa University and the University of Doha for Science and Technology providing relevant curricula, the availability of graduate and post-graduate studies at other institutions is still limited.[132].

According to the IMD World Talent Ranking 2021, graduates in sciences (ICT, Engineering, Math and Natural Sciences) represented ~24% of Qatar's total number of graduates, placing it 35th out of 64 countries analyzed. This share is higher than in other GCC countries except the UAE (~31%), and in other top ICT countries signaling a good starting point for Qatar, but with room for development to reach higher levels.

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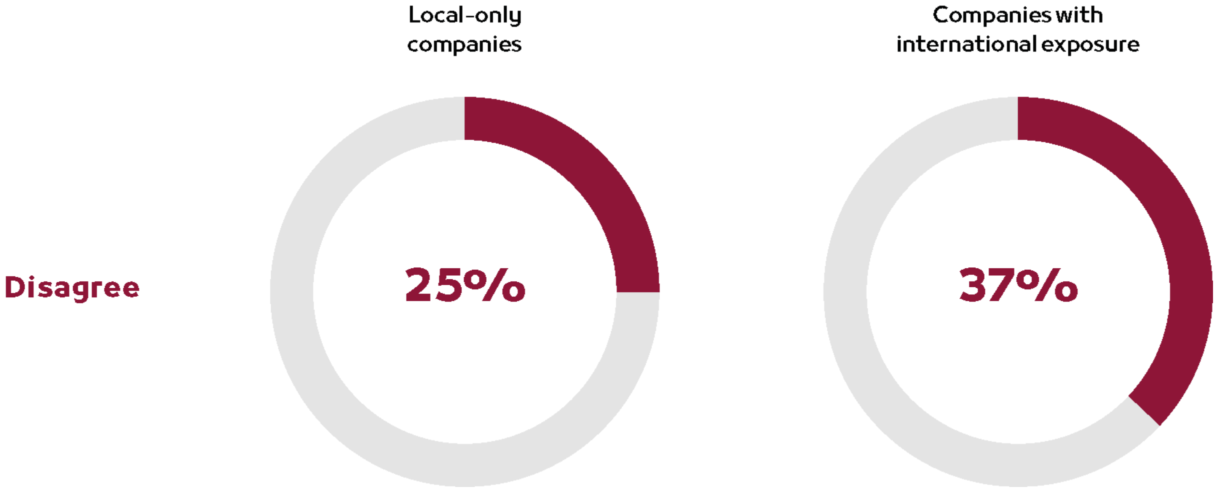
[131] The Times Higher Education, https://www.timeshighereducation.com/world-university-rankings/qatar-university

[132] Source: public information available online from universities in Qatar

Despite the presence of relevant education programs, local professionals will continue to be complemented by foreign employees; indeed, a significant share of the companies surveyed expressed concerns about the availability of local talent (Figure 88). Concerns are wider spread among companies with international exposure[133], of which 37% do not consider local talent to be amply available (Figure 89). A higher dissatisfaction rate might be linked to different expectations of these companies due to their experience and exposure in other markets.

**Figure 89. Share of Companies Disagreeing with the Statement that Qatari Talent is Available (% of respondents by geographical scope)**



n = 362
Source: CRA ICT Sector Survey 2022

69% of surveyed companies expect the number of expats working in Qatar's ICT sector to increase, continuing the trend observed in recent years. In contrast, only 43% of respondents expect the employment of Qatari nationals to increase.

## 8 – Employers have a mixed perception of Qatar's local workforce quality: room for improvement exists, as ICT capacity building and upskilling programs start to emerge

Mass survey responses and expert interviews yield a mixed picture regarding the quality of Qatar's workforce: some employers have an overall positive opinion, while others less so. This highlights opportunities for improvement through local skill development programs.

Overall, only 40% of respondents to the CRA ICT Sector Survey 2022 believe that the quality of Qatar's local ICT labor is adequate. Once again, companies with international exposure, be they headquartered in Qatar or not, tend to have a less positive view: only 36% of them see the Qatari workforce as adequate in quality,

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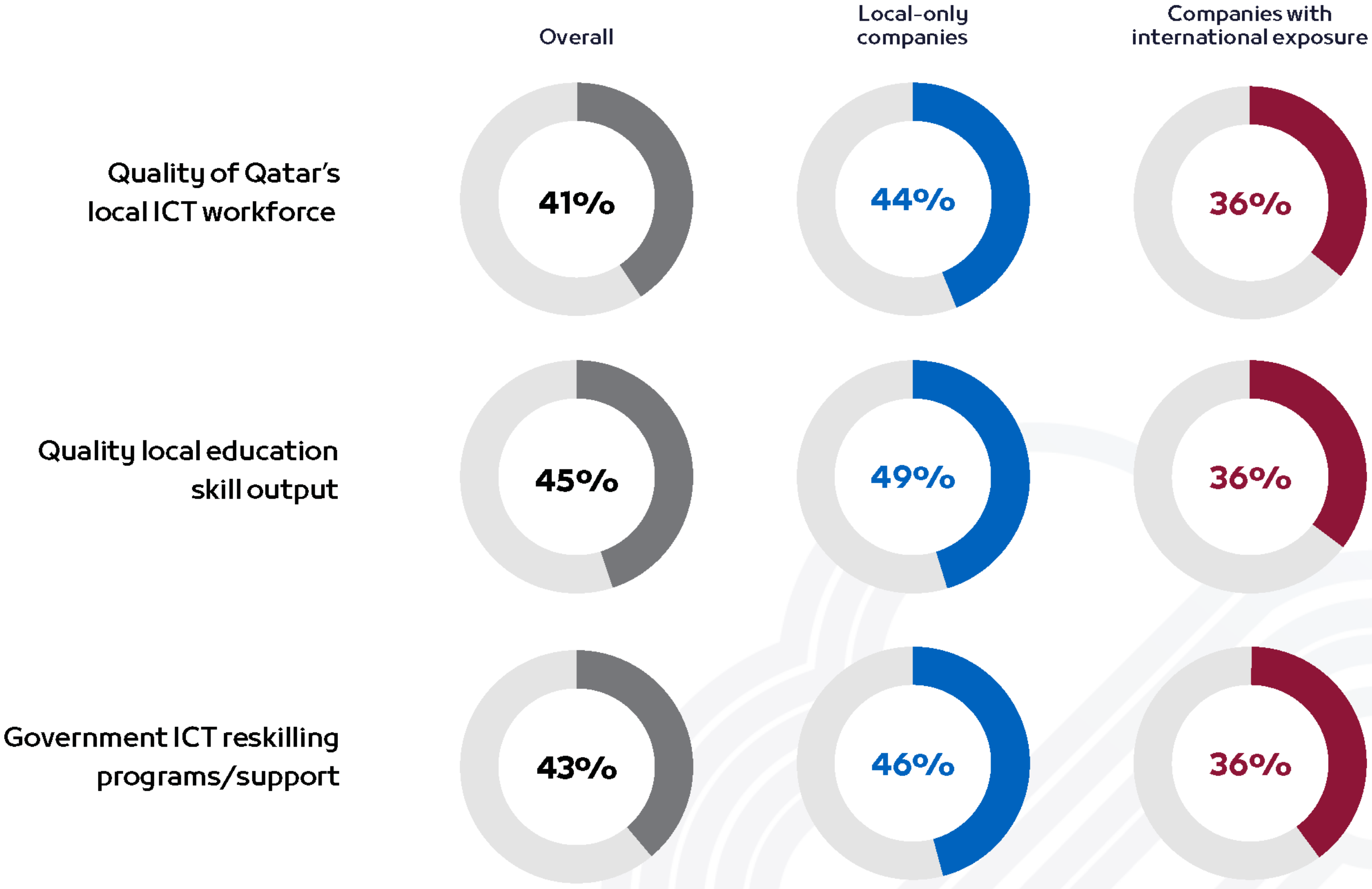
[133] Companies that do not only serve Qatar, including both companies with headquarter in Qatar and companies with headquarter abroad

with the rest either disagreeing or not being fully satisfied. Local companies that serve the Qatari market skew toward a more positive perception, with just below half considering local talent adequate. Startups are less happy with the local ICT workforce, with only 34% considering it adequate as opposed to 45% of mature companies. This segment also reports more challenges in attracting high-quality talent and employing Qatari nationals.

Mixed opinions also emerge from the CRA ICT Sector Survey 2022 concerning government support for ICT reskilling: less than half of the surveyed companies think that the government provides ample ICT reskilling support, a share that drops to 36% for companies with international exposure (Figure 90). This suggests the need to enhance talent development programs. Differences in opinion might be partially driven by different expectations that local and international companies have and proves the strong need for the digital centers of excellence seen emerging in Qatar.

Interviews with industry representatives confirm the mixed perceptions regarding the quality of the local workforce: multiple interviewees noted that local talent can be suitable for junior positions, while more senior positions typically require experienced foreign professionals. Some have highlighted, however, that the quality of local graduates has improved in recent years.

**Figure 90. ICT Companies' Perception of Local ICT Workforce and Upskilling Initiatives (% of positive perception responses by geographical scope)**



n = 362
Source: CRA ICT Sector Survey 2022

Figure 91. Qatar's Position in Relevant Rankings Assessing Quality of Talent

**Rankings across Key Dimensions**

| | | **Qatar** | **UAE** | **KSA** |
|---|---|---|---|---|
| | | Local talent | | |
| **WEF Global Competitiveness Index (2019)** | Employers' opinion on skills of current workforce (Survey-based) | **11** | 15 | 23 |
| | Employers' opinion on skillset of graduates (Survey-based) | **8** | 14 | 32 |
| | | Overall | | |
| **IMD World Talent Ranking 2021** | Overall ranking (out of 64) | **31** | 23 | 38 |
| | | Local talent | | |
| | Investment and development in local talent [134] | **44** | 50 | 37 |
| | | Overall | | |
| **INSEAD Global Talent Competitiveness Index 2022** | Overall ranking (out of 133) | **38** | 25 | 43 |
| | | Local talent | | |
| | Ability to grow talent [135] | **39** | 19 | 33 |

Source: WEF Global Competitiveness Report (2019), IMD World Talent Ranking 2021, INSEAD Global Talent Competitiveness Index 2022.[136]

Survey-based sub-components of the World Economic Forum's (WEF) Global Competitiveness Index suggest that Qatar performs well in terms of executives' satisfaction with the quality of the general workforce, achieving a ranking position which is higher than both the UAE and KSA.[137] However, rankings based on both survey and hard data inputs, such as the IMD World Talent Ranking and INSEAD Global Talent Competitiveness Index, suggest room for improvement in terms of competitiveness of the overall talent pool as well as of the local component specifically (Figure 91). Although Qatar is already positioned among the top 40 countries in both rankings, further dedication to talent development can lead the State to closing the remaining gap with regional leaders and moving closer to global top performers.

Aside from enhancing current outcomes, new and existing talent development programs will need to keep pace with emerging technologies and trends (e.g., Blockchain, Edge, XR, IoT, cybersecurity, and big data) and follow the continuous evolution of the industry locally and internationally.

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[134] Includes considerations on education and training (including spending) as well as gender diversity

[135] Includes considerations on education (e.g., enrolment, spending and quality) and lifelong learning as well as access to growth opportunities

[136] WEF Global Competitiveness Report, https://www.imd.org/centers/world-competitiveness-center/rankings/world-talent-competitiveness/, IMD World Talent Ranking, https://www.imd.org/centers/world-competitiveness-center/rankings/world-talent-competitiveness/, INSEAD Global Talent Competitiveness Index, https://www.insead.edu/sites/default/files/assets/dept/fr/gtci/GTCI-2022-report.pdf

[137] Non-ICT specific

**ICT-focused skilling and upskilling initiatives are starting to emerge, including through collaboration between the private sector and educational institutions or public entities**

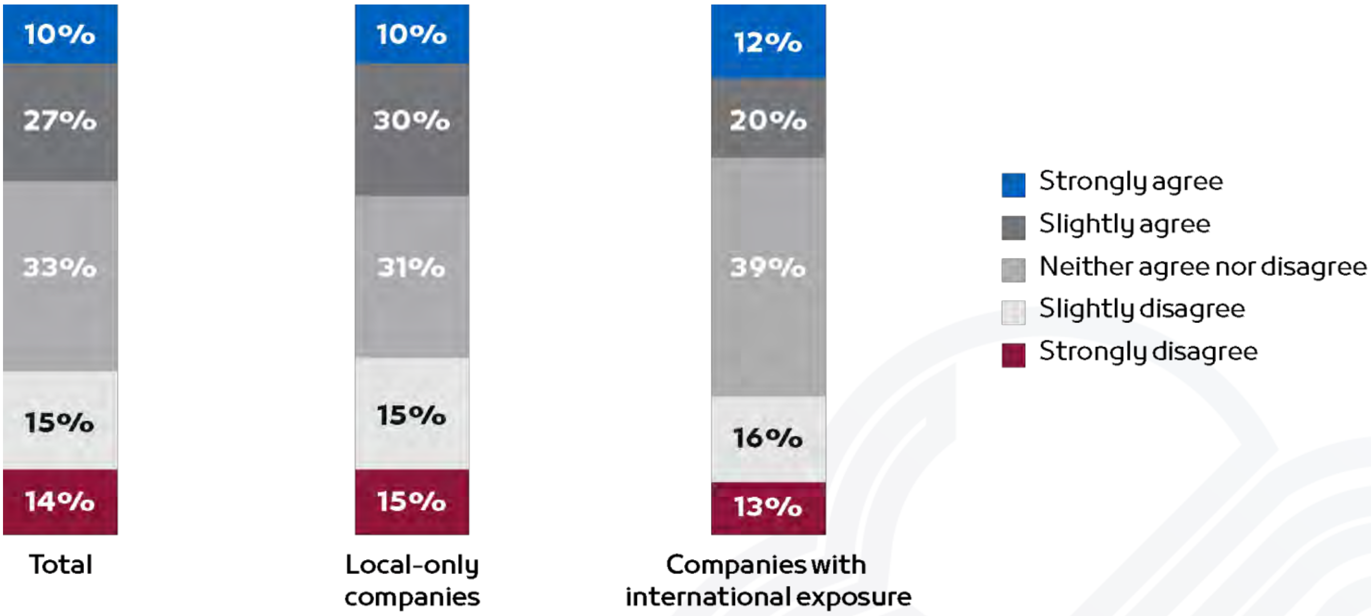
- The Huawei ICT Academy Lab[138] was announced in March 2022 and planned for opening at the Community College in Qatar (CCQ). Huawei announced that the ICT Academy Lab will train participants in a real-world environment using Huawei equipment before graduating with high-level Huawei Certifications. The Lab will also support CCQ's research by providing access to technology and platforms and participating in collaborative projects.

- The Ministry of Communications and Information Technology has collaborated with Microsoft to launch Qatar's National Skilling Program to accelerate sustainable human development and digital transformation in line with Qatar National Vision 2030 and both in partnership with Elev8, a company specialized in skilling and upskilling, having previously established a Digital Center of Excellence. The center was inaugurated in March 2022, an initiative that aims to equip Qatar residents with skills in cutting-edge technologies. Qatar's National Skilling Program aims to train 50,000 people across all demographics by 2025 and empower them with the advanced digital skills they need to drive innovation and contribute to boosting the country's regional and global competitiveness.

- Google Cloud launched its Center of Excellence training facility in Qatar in June 2021, to train more than 2,000 individuals and businesses a year in Google tools and technologies. The Digital Center of Excellence was launched in partnership with the Qatar Free Zone Authority (QFZA), the Ministry of Transport and Communications (now Ministry of Transport and Ministry of Communications and Information Technology) and Intel [139]. It began with a virtual offering, and will launch a physical presence in 2023.

## 9 – Employing Qatari nationals remains costly, driven by generous employment conditions in the government and quasi-government sectors

Figure 92. Opinion of ICT Companies on the Affordability of Qatari National ICT Labor Cost (% of responses)



n = 362
Source: CRA ICT Sector Survey 2022

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[138] Huawei forum, https://forum.huawei.com/enterprise/en/huawei-opens-ict-academy-lab-at-ccq/thread/844399-100487

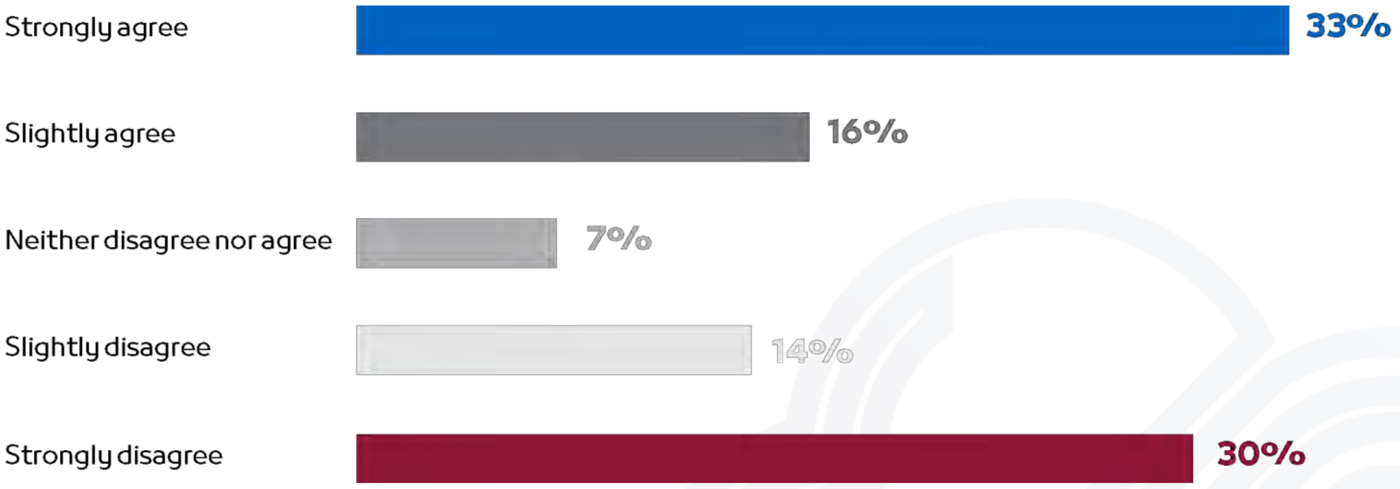
[139] The Peninsula Qatar, https://thepeninsulaqatar.com/article/10/03/2022/google-cloud-aims-to-train-over-2,000-participants-every-year

Qatari nationals are perceived as a costly labor input, with only 37% of surveyed companies agreeing that the cost of local Qatari labor in ICT functions is affordable (Figure 92); this percentage drops to 32% for companies with international exposure. As mentioned above, the public sector continues to be the preferred employer of Qatari nationals due to its high wages, which drives up salary expectations and therefore the cost of Qatari labor. Entrepreneurship, however, can emerge as an appealing alternative career path for nationals, offering attractive self-employment opportunities. Some relevant cases of successful startups led by citizens already exist including in the ICT sectors, for example through Snoonu, Ibtechar and Qchain.

## 10 – Qatar faces increased competition for talent due to the global gap, but it can enhance its positioning by further improving quality of life and immigration requirements/processes, and by creating an ICT ecosystem that offers attractive professional growth opportunities for talent

As previously mentioned, given limitations in size, experience of the local talent pool, and the importance of diversity, ICT companies will continue to be largely dependent on foreign labor. It is therefore important that local businesses can access, attract, and retain highly skilled foreign professionals. The shortage of ICT talent is a global phenomenon, with Korn Ferry predicting a gap of 4.3mn skilled technology workers worldwide by 2030[140]. Therefore, global competition for talent is becoming increasingly fierce. In local context, it resonates well with 49% of CRA-surveyed ICT companies agreeing with the statement that foreign talent is amply available and easy to hire in Qatar (Figure 93).

**Figure 93. ICT Companies' Perception on Availability and Ease of Employment of International ICT Talent in Qatar (% of responses)**



n = 362
Source: CRA ICT Sector Survey 2022

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[140] Korn Ferry, The future of work – the global talent crunch, https://focus.kornferry.com/wp-content/uploads/2015/02/The-Global-Talent-Crunch.pdf

Most survey-based rankings place Qatar and Doha highly on the global list of attractive locations for expats, but the UAE and Dubai continue to lead in the regional context, representing strong competition for talent (Figure 94). These studies and rankings find that Qatar performs well in terms of ease of finding housing, the level of compensation in the country, safety and social security. However, it tends to fall short of expats' expectations in terms of cost of living, job satisfaction (e.g., security, working hours), and availability of leisure options.

**Figure 94. Regional Benchmark for Attractiveness for Expats (Qatar vs. UAE rankings)**[141]

| | HBC Expat Explorer 2021 | Expat Insider City Ranking Report 2021 | INSEAD Global Talent Competitiveness Index (Attract Pillar) 2022 | IMD World Talent Ranking (Appeal Pillar) 2021 |
|---|---|---|---|---|
| **Qatar** | **10th** | Doha<br>**15th** | **23rd** | **25th** |
| **UAE** | **4th** | Dubai<br>**3rd**<br>Abu Dhabi<br>**16th** | **5th** | **12th** |

Source: HSBC Expat Explorer Survey, Internations Expat City Ranking 2021, INSEAD Global Talent Competitiveness Index 2022, IMD World Talent Ranking 2021

The IMD World Talent Ranking 2021[142], which includes a mix of survey inputs and quantitative evidence, places Qatar 25th out of 64 countries for its appeal to foreign professionals, with its performance deteriorating over time (a 9th place ranking in 2017, and 21st in 2020). In comparison, the UAE ranks 12th for appeal. Based on the IMD assessment, below are highlighted areas where Qatar needs to improve its performance (Figure 95).

**Figure 95. Main Areas of Underperformance in Qatar vs. UAE (IMD World Talent Ranking)**

| | Overall index | Exposure to particle pollution | Remuneration of service professionals | Remuneration of management | Companies considering attraction and retention of talent a priority | Worker motivation |
|---|---|---|---|---|---|---|
| **Qatar** | **25th** | **63rd** | **31st** | **30th** | **23rd** | **17th** |
| **UAE** | **12th** | **60th** | **24th** | **23rd** | **14th** | **8th** |

Source: IMD World Talent Ranking 2021

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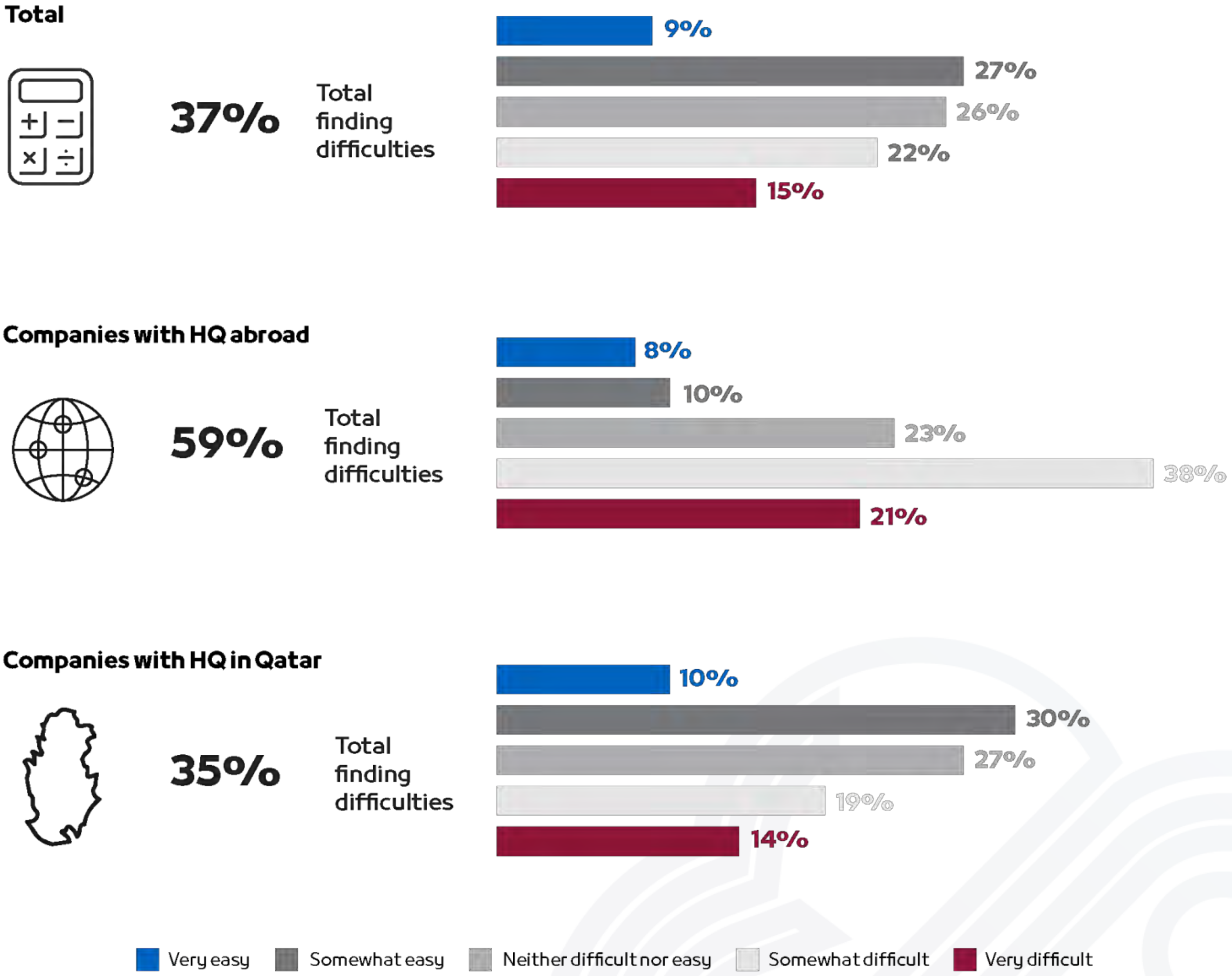
[141] HSBC, Expat Explorer Survey, https://www.expat.hsbc.com/expat-explorer/; Internations, Expat City Ranking 2021, https://cms-internationsgmbh.netdna-ssl.com/cdn/file/cms-media/public/2021-11/Expat-Insider_City-Ranking-Report-2021_1.pdf

[142] IMD World Talent Ranking

It is important to highlight how remuneration for higher positions, companies' commitment to retention of talent, worker motivation and job satisfaction emerge as key areas for improvement. As highlighted by interviewed industry stakeholders, the ability of the ICT sector to attract and retain skilled expats will largely benefit from an ICT ecosystem that offers more attractive professional growth opportunities, for example through innovation and R&D projects that allow for expertise development.

Furthermore, according to the survey, the difficulty in hiring foreign talent in Qatar seems to be exacerbated by regulatory constraints (Figure 96); 37% of the surveyed companies find regulatory aspects of access to foreign labor burdensome. This proportion is considerably higher – 59% – for international companies (those with headquarters out of Qatar) whose perception is influenced by the perspective of other markets they work in.

**Figure 96. Respondent's Opinions on the Complexity of Regulation Around Access to Foreign Labor in Qatar (% of responses)**



n = 362
Source: CRA ICT Sector Survey 2022

Interviews with industry representatives confirm that employment and visa regulations/processes hinder smooth recruitment of international talent. Most companies pointed out that, despite recent improvements, immigration processes remain somewhat opaque and cumbersome, especially when compared to the UAE's recent labor law amendments aimed to help employers attract and retain talent.

# R&D and Innovation

## KEY FINDINGS

R&D and Innovation Outcomes

01

As with other GCC countries, Qatar innovates less than leading global ICT economies

02

Qatar's knowledge creation outcomes are on par with GCC peers, but fall behind ICT-advanced countries

03

Commercialization of emerging knowledge remains a challenge for ICT companies in Qatar

04

Qatar's startup activity has been growing in recent years, with the VC market doubling in 2021 vs. 2020, but further progress is required to match regional and international benchmarks

R&D and Innovation Drivers

05

Although in line with regional benchmarks, the quality and quantity of innovation drivers in Qatar still falls behind leading ICT countries and despite existing demand for innovative ICT products, further development is needed in terms of innovation spending and investments, talent, relevant regulatory sandbox and ecosystem interoperability

06

Qatar is 2nd among Gulf states in terms of R&D spending as a share of GDP, but lags top ICT countries

07

Qatar's government drives knowledge creation and innovation, while the participation of the private sector remains limited

08

In ICT specifically, less than 40% of the surveyed companies currently engage in R&D and innovation activities, but a large share have plans to launch RDI initiatives

## Introduction to Innovation

As Qatar works to transition into a knowledge economy in alignment with the Qatar National Vision 2030, the role of R&D and innovation is of great importance. The Qatar Research, Development and Innovation Council's Strategy 2030 (QRDI 2030) details a path to integrate and develop the local RDI landscape in support of national imperatives. RDI is of particular importance to the ICT sector as it has the potential to localize value chains in Qatar, attract world-class talent, and encourage domestic and international investments in the sector – sector growth components which demand a robust local RDI ecosystem.

Innovation goes beyond Research & Development (R&D). Indeed, R&D is the process of generating new knowledge while innovation transforms this knowledge – whether acquired or developed internally – into commercially viable solutions and economic value.

## R&D and Innovation Outcomes

### 1 – As with other GCC countries, Qatar innovates less than leading global ICT economies

The Global Innovation Index[143] ranks Qatar's innovation ecosystem 52nd, broadly in line with other GCC countries, but well behind global ICT leaders. This index provides a two-fold view: the extent to which countries deploy the required input to stimulate innovation, and whether the input achieves the desired outcome. Focusing on outcome specifically, Qatar seems to be innovating on par or better than most GCC countries. However, the UAE remains at the forefront of regional innovation.

Although regional perspective remains important, Qatar's innovation performance must be analyzed within a global context given the increasing competition in the ICT sector and digital transformation trends worldwide. A comparison against countries most advanced in ICT[144] indicates that both Qatar and the region have room for enhanced performance, with the gap between regional and global levels signalling the opportunity for Qatar to play a larger role in leading regional innovation. Norway's 25th place ranking for output (related to knowledge and technology outcomes as well as creative outputs) suggests that even relatively small, oil and gas-driven economies can innovate on a global level (Figure 97).

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[143] Index developed by the World Intellectual Property Organization (WIPO) that ranks countries according to both innovation input (institutions, human capital and research, infrastructure, market sophistication, business sophistication) and output (knowledge and technology outcomes; creative outputs)

[144] Includes Switzerland, Republic of Korea, USA, Denmark, Singapore, Norway, Luxembourg, and the Netherlands

Figure 97 Global Innovation Index Benchmark – GCC vs. Top Global Performers Rankings (2022)

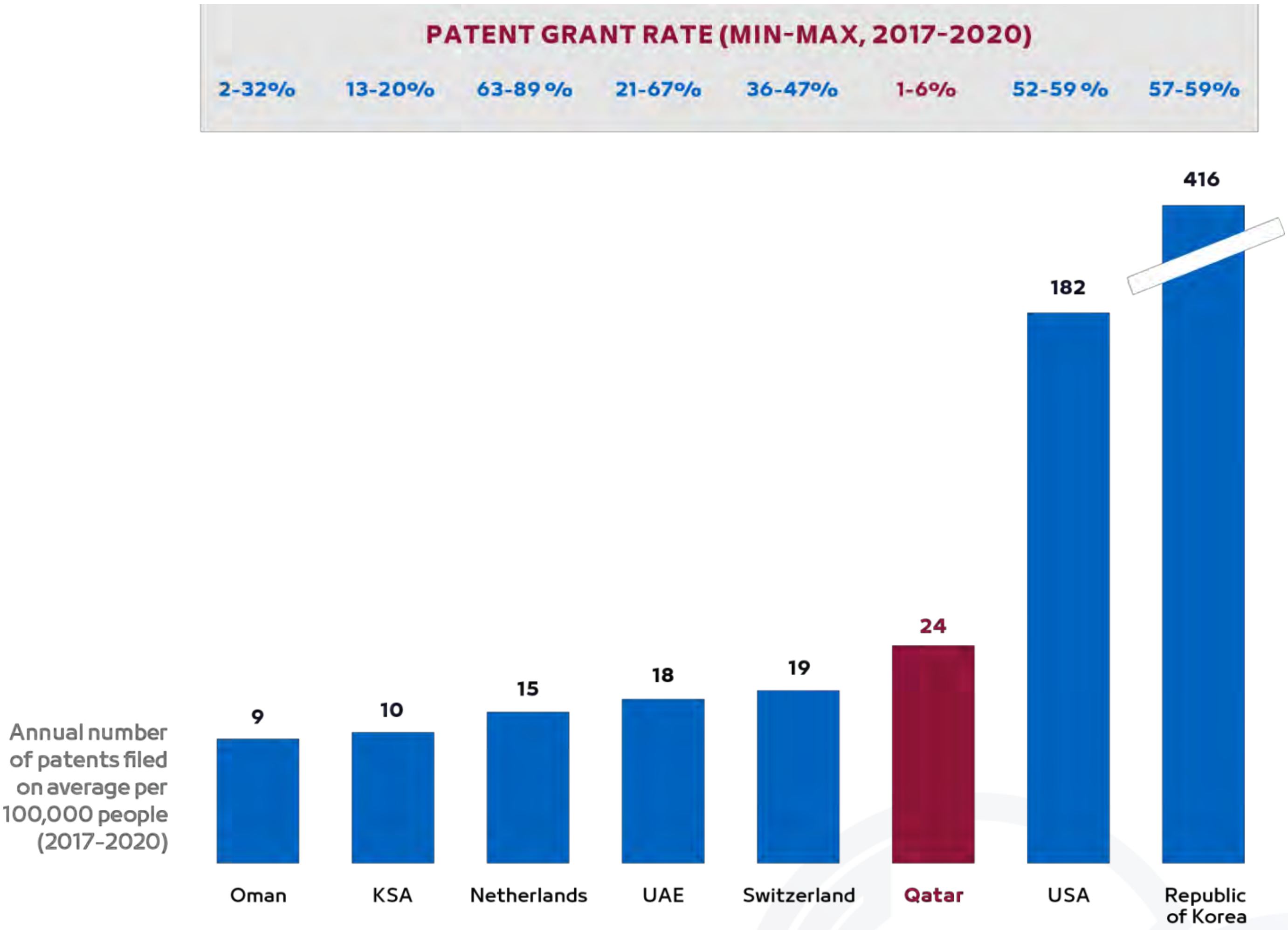
| | Country | Output Sub-index | GII Overall Ranking |
|---|---|---|---|
| **Top performers** | Switzerland | 1 | 1 |
| | USA | 5 | 2 |
| | Netherlands | 6 | 5 |
| | South Korea | 4 | 6 |
| | Singapore | 14 | 7 |
| | Denmark | 10 | 10 |
| | Luxembourg | 18 | 19 |
| | Norway | 29 | 22 |
| **GCC Countries** | UAE | 52 | 31 |
| | Saudi Arabia | 65 | 51 |
| | **Qatar** | **67** | **52** |
| | Kuwait | 66 | 62 |
| | Bahrain | 86 | 72 |
| | Oman | 87 | 79 |

Source: The WIPO annual reports

## 2 – Qatar's knowledge creation outcomes are on par with GCC peers, but fall behind ICT-advanced countries

Innovation comprises knowledge creation and commercialization, both key components of a knowledge-based economy. Evidence suggests that Qatar has a vibrant knowledge generation ecosystem in place; for example, the average number of patents filed per 100,000 inhabitants is larger than in other GCC countries. However, in contrast to other countries, only 6% of patent requests are accepted (Figure 98). This highlights room to raise the quality of the knowledge generated and, potentially, develop further patenting practices.

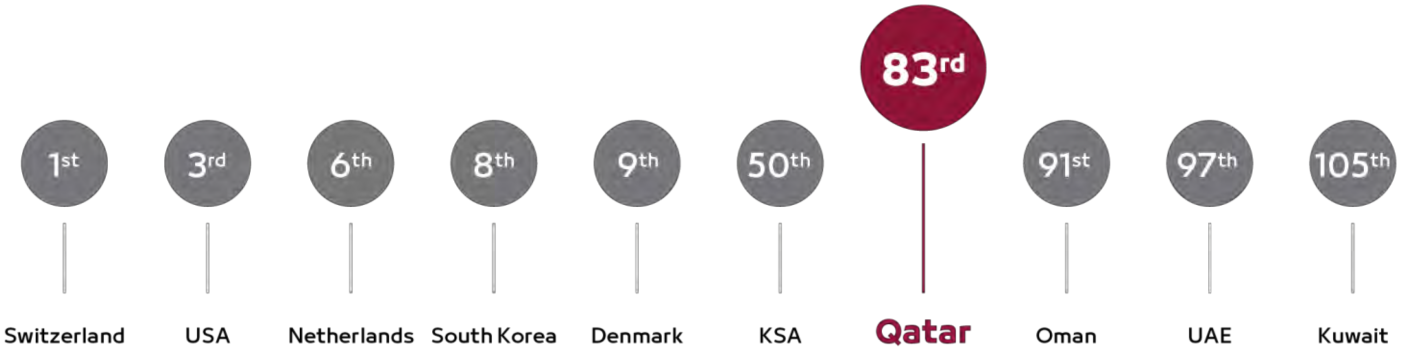
Figure 98. Average Total Patents Filed Annually and Minimum/Maximum Patent Grant Rate (2017-2020)



Source: The WIPO Intellectual Property Statistics

As further evidence of Qatar's potential, for overall knowledge creation Qatar performs better on the GII compared to all other GCC countries except for Saudi Arabia (Figure 99). In particular, the GII ranks Qatar 73rd for scientific and technical articles and 66th for citable documents, ahead of the UAE.

Figure 99. Benchmark on Knowledge Creation (GII) – GCC vs. Top ICT Global Performers Rankings (2022)



Source: The WIPO annual report 2022

## 3 – Commercialization of emerging knowledge remains a challenge for ICT companies in Qatar

As highlighted above (see the Market Landscape section for more details), local ICT companies in Qatar[145] generally show limited adoption of emerging technologies. Based on the 2022 CRA ICT Sector Survey, almost half of these companies (48%) focus exclusively on traditional technology, and multiple ICT stakeholders interviewed highlighted that R&D outcomes in Qatar are not effectively transformed into innovative products or business models that can be successfully commercialized. Since innovation relies on transforming locally developed or acquired knowledge into viable businesses, the private sector's limited ability to do so represents an important barrier to growing a knowledge-based economy. Qatar's Research, Development, and Innovation 2030 Strategy (QRDI 2030) highlights commercialization as a key opportunity for growth and seeks to improve commercialization prospects through enhanced intellectual property protections. QRDI and other key local R&D stakeholders, such as the Hamad Bin Khalifa University's QRCI, have undertaken initiatives to support the commercialization of knowledge generated in Qatar; this effort, however, needs to be expanded and reinforced. As noted below, enhancing the link between research and the business sector is a must for this to happen.

> **Currently, there is no industry in the country to translate R&D into proof-of-concept products that can be successfully marketed.**
>
> **— ICT investor in Qatar**

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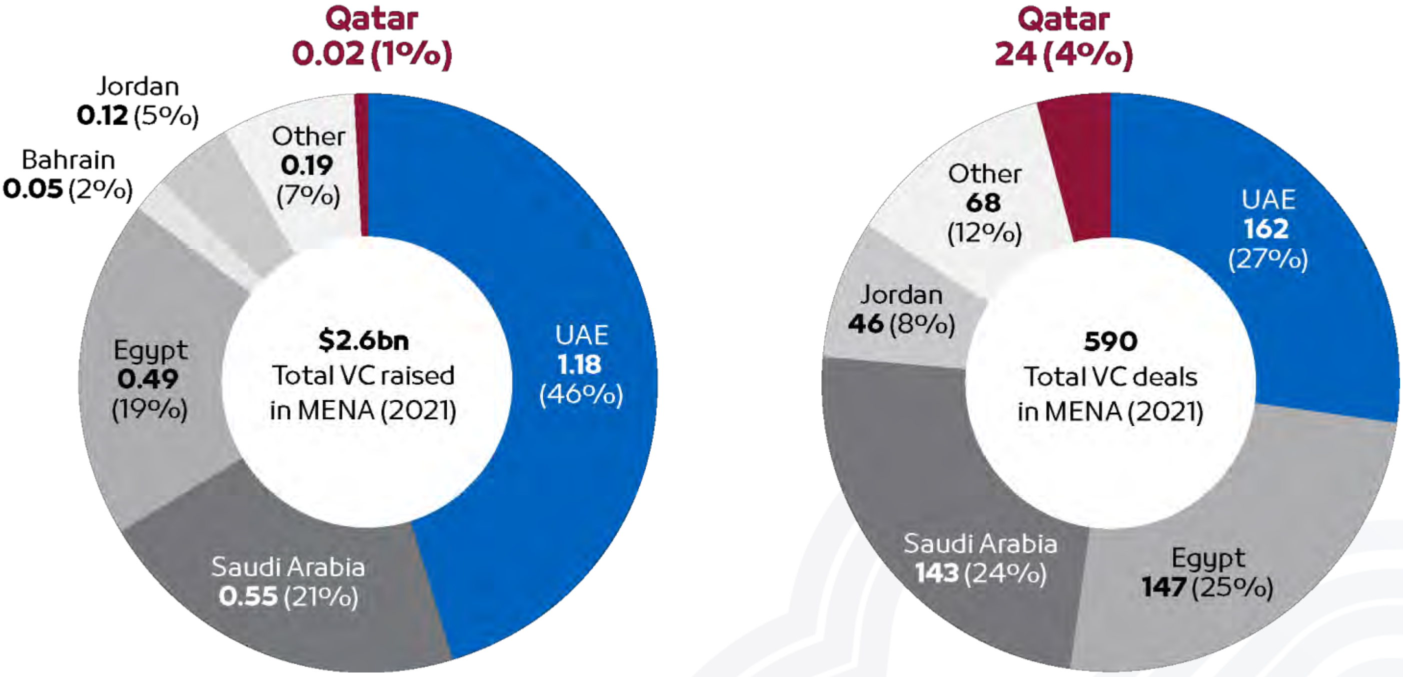
[145] i.e., companies with headquarters in Qatar and primarily focused on the local market

## 4 – Qatar's startup activity has been growing in recent years, with the VC market doubling in 2021 vs. 2020, but further progress is required to match regional and international benchmarks

The World Economic Forum (WEF) describes startups as "an engine of change" as they tend to be more successful than larger companies at creating innovative business models. In 2021, 24 startups received venture capital (VC) funding in Qatar, with total funding almost doubling when compared to 2020 levels. This increase was mainly driven by a larger portion of deals involving late-stage ventures[146], which might signal a maturing ecosystem and more businesses successfully passing early-validation phases. Indeed, in 2021, the three largest deals closed in Qatar raised 52% of the total capital deployed in the country.[147]. Qatar Development Bank (QDB), Doha Venture Capital (DVC), QSTP, Doha Tech Angels, QIC Digital Venture Partners are some examples of the entities that offer VC funding to tech startups.

2021 also saw the successful exit of Meddy, a Qatar-headquartered healthcare startup acquired by Nigeria's Helium Health. Meddy is among a handful of notable exits in the Qatari startup market; in May 2022 Qatar's leading tech startup Snoonu acquired the Oman-based delivery platform Akeed for $10 million while looking further at an expanded regional presence[148]. Wider availability of VC for Qatar would boost sector growth and build even larger export capabilities.

Figure 100. MENA Venture Capital Raised and Deals Closed (2021)



Source: MAGNiTT MENA 2022 Venture Investment Report

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[146] Therefore, ventures with higher valuations

[147] Qatar Venture Investment Report, MAGNiTT 2021

[148] GCC Business News, https://www.gccbusinessnews.com/qatars-tech-startup-snoonu-acquires-omani-food-delivery-platform-akeed/

However, despite recent developments, Qatar's startup ecosystem has yet to emerge as a MENA innovation hub, both in number of ventures and success cases. In 2021, the UAE, Egypt, and Saudi Arabia accounted for 75% of total VC deals and 85% of funding allocated to startups in the region. Qatar, by comparison, captured a mere 1% share of the USD 2.6bn MENA VC market and 4% of the region's 590 VC deals (Figure 100). This is likely the result of limited availability of funds specifically allocated to VC and the limited supply of attractive target ventures. Furthermore, VC deals in Qatar tend to be considerably smaller than in peer countries (USD 750k vs. USD 4.4M per the MENA average).

Gaps in the venture capital ecosystem are also reflected in Qatar's GII ranking; specifically, it is placed 54th worldwide in terms of financial investment in innovation behind KSA (14th) and the UAE (20th). Kuwait and Bahrain rank very close to Qatar[149].

Besides representing a large portion of the MENA VC market, the UAE and Saudi Arabia also boasted multiple exits and some regional success cases.[150] To illustrate, the UAE saw 11 startup exits in 2021 and 10 exits in the first half of 2022 (25% of total MENA), while Saudi Arabia had 5 exits in the same period in 2022. The UAE has been the funding source of ventures including Careem (later acquired by Uber), Souq.com (later acquired by Amazon) and Jawaker (later acquired by Stillfront).

In CRA interviews, multiple companies recognized the recent growth of startup activities in Qatar, but also highlighted the need to continue focusing on creating a local startup culture and developing a more competitive ecosystem to attract international entrepreneurs. Adding to the insights from the interviews, StartupBlink's 2022 Startup Ecosystem Report ranks Qatar 86th, behind Saudi Arabia (51st) and the UAE (27th). This gap is understood across the sector and many entities like QSTP, the Digital Incubation Lab, QDB/QBIC, MCIT's initiatives like the Digital Incubation Center and the TASMU Accelerator are working to further develop Qatar's ICT entrepreneurial landscape.

## R&D and Innovation Drivers

### 5 – Although in line with regional benchmarks, the quality and quantity of innovation drivers in Qatar still falls behind leading ICT countries and despite existing demand for innovative ICT products, further development is needed in terms of innovation spending and investments, talent, relevant regulatory sandbox and ecosystem interoperability

According to the Global Innovation Index, the quality of innovation input in Qatar (i.e., institutions, human capital, infrastructure, markets and business sophistication) is on par with Saudi Arabia and outperforms most other regional peers; however, the UAE remains the GCC leader. A comparison between Qatar and more advanced ICT adopters[151] finds that the

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[149] Among other indicators, the GII looks at venture capital relative to GDP PPP to assess countries along the investment pillar (one of the input sub-pillars)

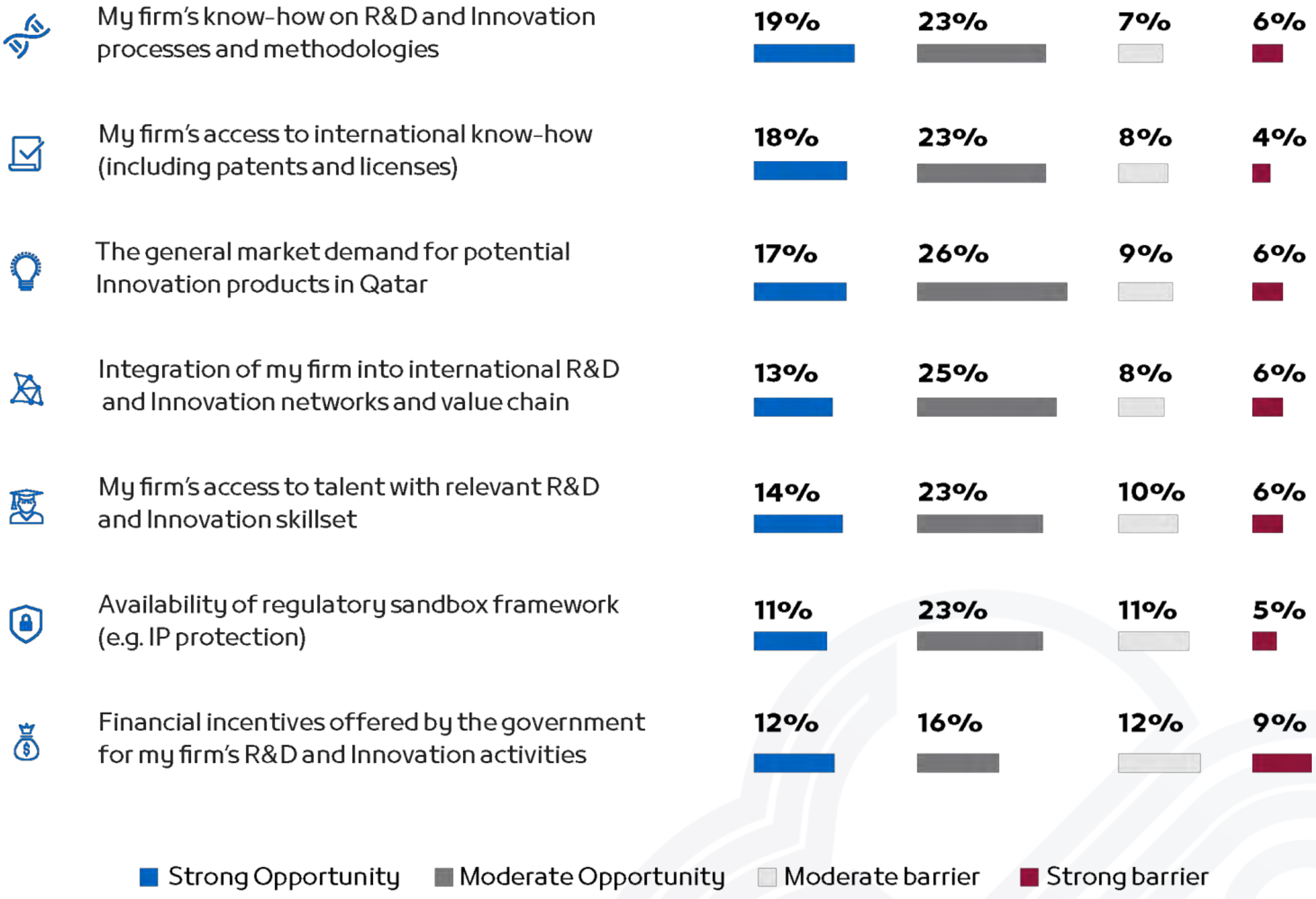
[150] Qatar Venture Investment Report, MAGNiTT 2021; Startup exits escalate in UAE, AGBI 2022

[151] Includes countries like USA, Switzerland, Singapore, China, Republic of Korea, Hong Kong, Canada, Norway, and Australia

State, as with other GCC countries, must further improve in terms of innovation drivers to reach best performing benchmarks. The GII rates Qatar relatively well in terms of general infrastructure, political stability, and some aspects of doing business, but factors as innovation spending, investments, employment and innovation linkages are identified among the most critical areas for development (further details below).

Evidence from the GII is confirmed by the findings of the CRA ICT Sector Survey 2022. Although a significant proportion of companies surveyed see market opportunities for innovation in Qatar and can access know-how, only one third of them think that existing government financial incentives represent an opportunity. Other areas for improvement identified are the innovation regulatory sandbox and access to talent (Figure 101). This view is shared both by companies engaging in or seeking to engage in R&D and innovation as well as companies that are not interested, and it has been confirmed by stakeholder interviews.

**Figure 101. ICT Industry Perception on R&D and Innovation Opportunities/Barriers within Qatar's ICT Sector (% of responses)**



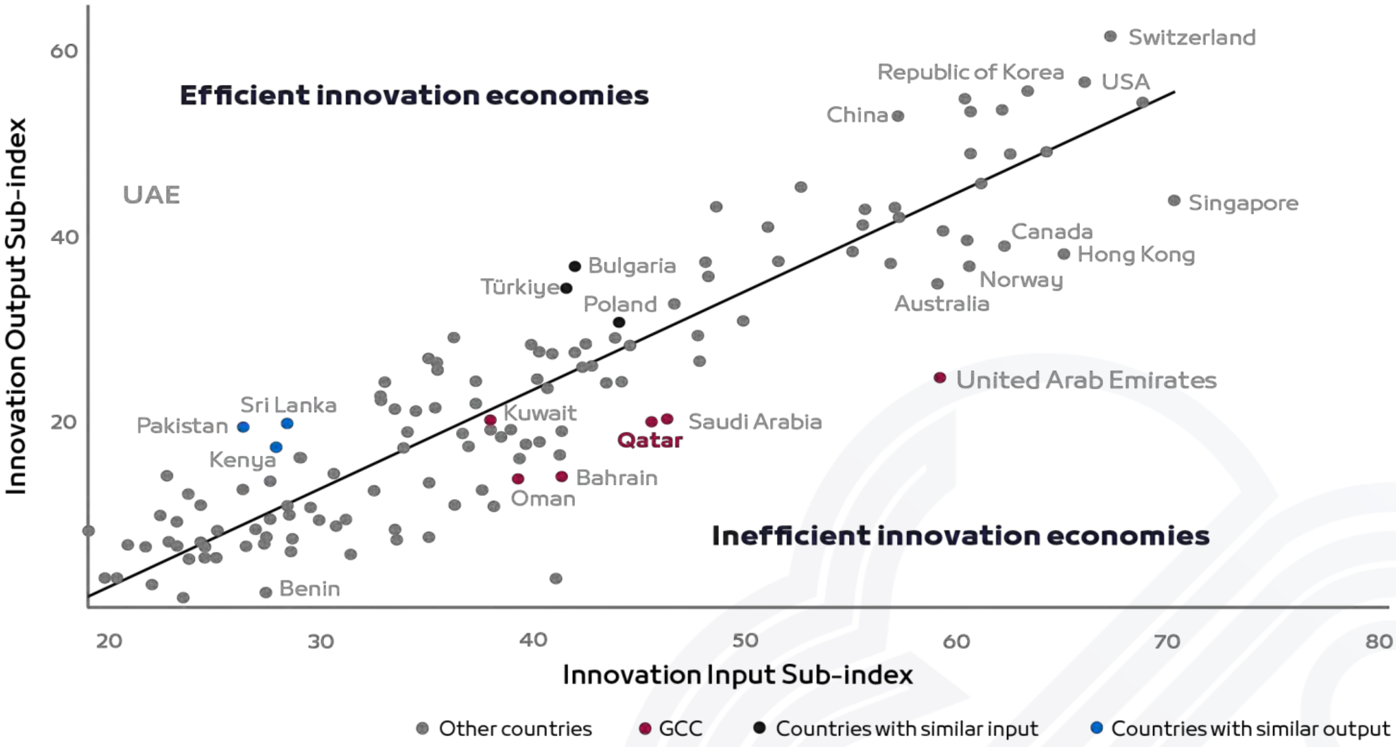
n = 362

Source: CRA ICT Sector Survey 2022

> **The Ministry of Communications and Information Technology should introduce regulations for emerging technologies and push the adoption of these technologies with the private sector. Lack of regulations results in little progress from startups.**
>
> — **Qatari technology accelerator**

Qatar, along with the rest of the GCC, performs consistently better in terms of deployed innovation input than it does for innovation output (Figure 102), indicating that the state is not effectively translating its innovation investments into outcomes. As a reference, at similar input scores, countries like Turkey,[152] Bulgaria, and Poland achieve greater and higher quality innovation outcomes. Qatar may need to improve the integration of different innovation components and stakeholders so they can work together more effectively, a sentiment that was strongly echoed in the CRA stakeholder interviews as many highlighted the lack of interconnection and collaboration among the different ecosystem stakeholders as a key challenge for innovation in Qatar.

**Figure 102. Innovation Output and Input Scores (GII, 2022)**



Source: GII 2022

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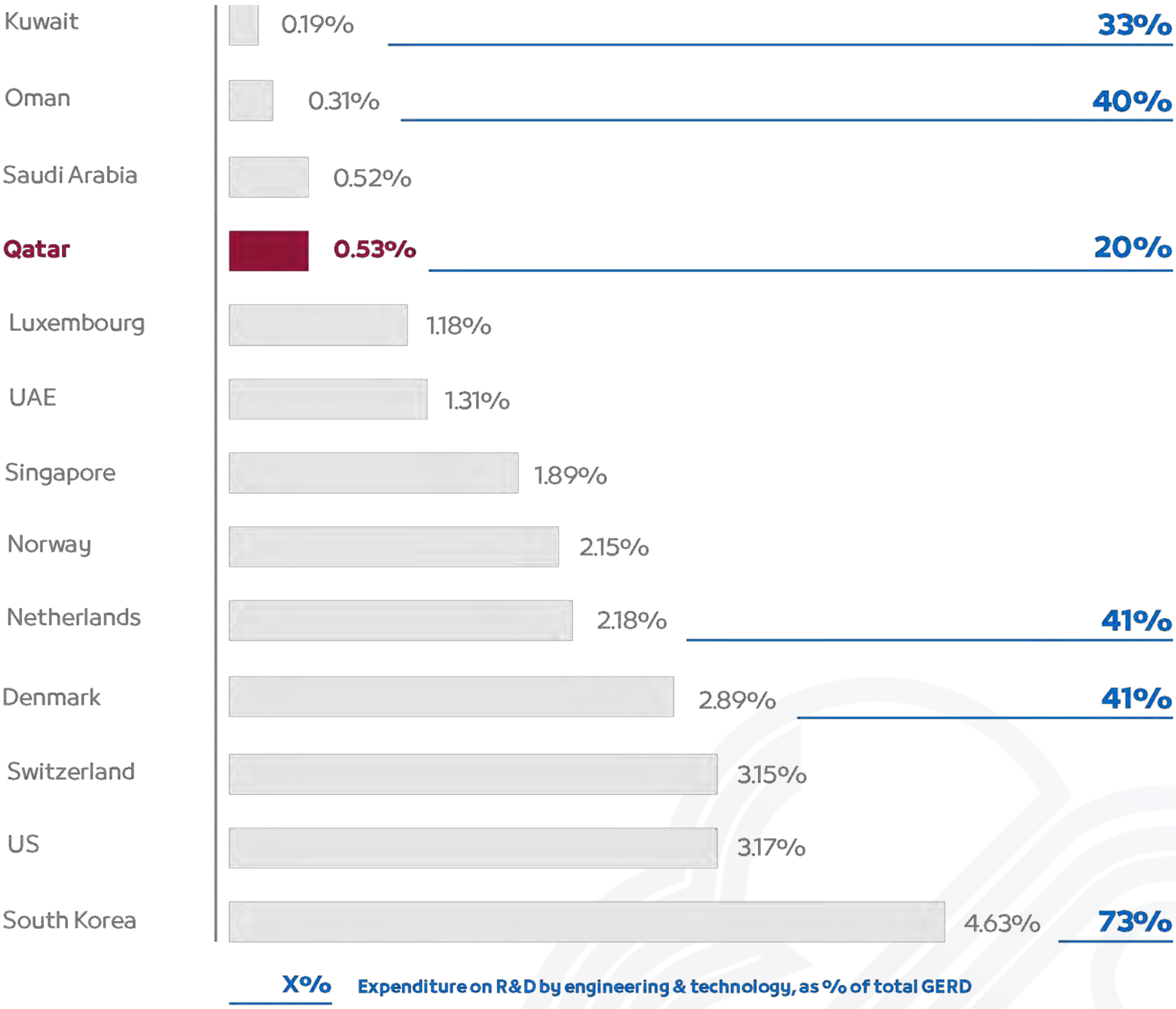
[152] i.e., Turkey, as referred to according to the United Nations' official nomenclature

## 6 – Qatar is 2nd among Gulf states in terms of R&D spending as a share of GDP, but lags top ICT countries

Gross Domestic Expenditure on R&D (GERD) as a share of GDP in Qatar is aligned with most other GCC countries, but lags that of the regional leader, the UAE, and especially of countries with leading ICT sectors (Figure 103). In Qatar, 20% of the GERD is directed to engineering and technology (inclusive of ICT as per definition), a share that could be increased based on a comparison with top peers; South Korea, a top R&D spender and innovator, allocates a record 73% of GERD to engineering and technology.

**Figure 103. GERD as a Percentage of GDP (2019)**[153]



Source: UIS UNESCO data

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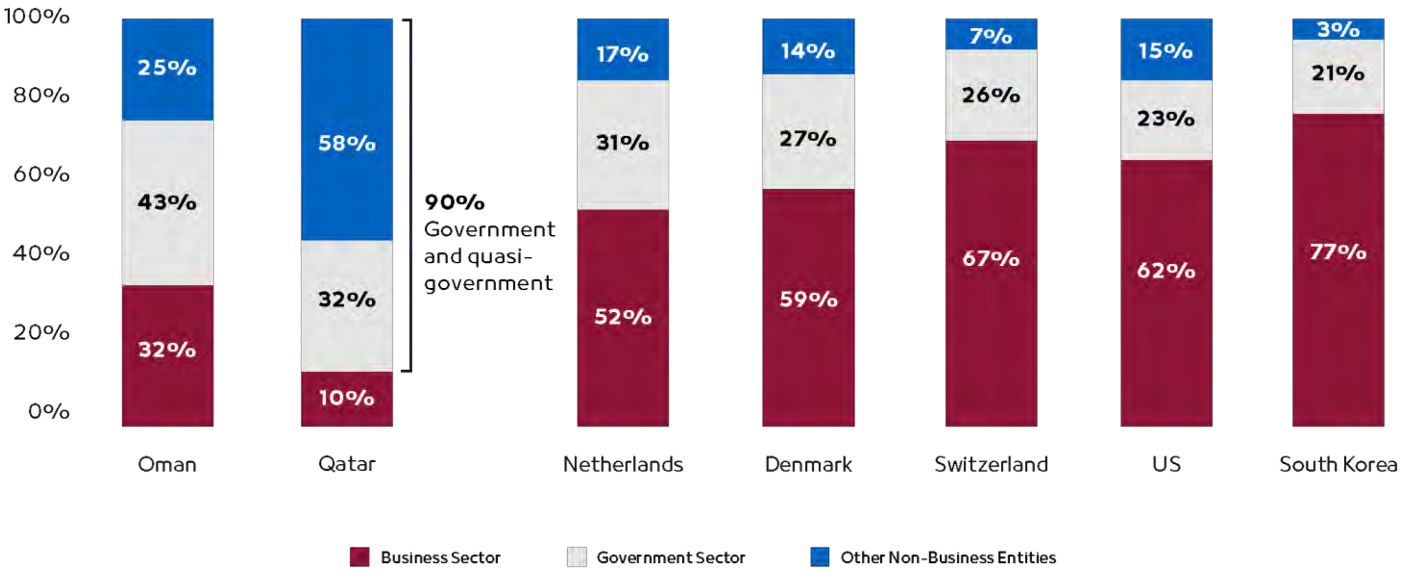
[153] Qatar data as of 2018, Saudi Arabia data as of 2020, all other countries data as of 2019

## 7 – Qatar's government drives knowledge creation and innovation, while the participation of the private sector remains limited

Figure 104. Gross Domestic Expenditure on R&D by Sector Contribution (2018)[154] (% of total GERD)



Source: UIS UNESCO data

Both public and quasi-public entities in Qatar are key to funding and directing knowledge generation and innovation; private sector businesses, by comparison, have limited influence. In terms of funding, governments and other non-business entities like higher education institutions and NGOs (typically government-backed) contribute 90% of the GERD[155] (Figure 104) Furthermore, the most prominent venture capital and incubation initiatives in the country are led by public entities (Figure 105).

Figure 105. Main Supporters of and Investors in Qatar-Based Startups

- Setup by Emiri Decree No. 14 in 1997 as a fully government-owned financial entity
- Founded by the QDB to support growth of the fintech industry
- Founded by the QDB as a mixed-use business incubation center
- Qatar Science & Technology Park (QSTP) is owned by the Qatar Foundation
- Digital Incubation Center is owned by the Ministry of Transport and Communications
- Doha Venture Capital Fund (DVC) is the global venture capital arm of Qatar Free Zones

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[154] Switzerland, Denmark, and the Netherlands data as of 2017; other non- business entities include higher education institutions and not-for-profit organizations

[155] Gross domestic expenditure on R&D

The Qatar Research, Development and Innovation Council was established in 2018 to drive the country's knowledge creation and innovation strategy. This government-led initiative brings together national and international experts from government, academia and industry across sectors that are strategic for the country and its R&D efforts. The Council developed the seven-pillar Qatar Research, Development, and Innovation Strategy 2030 (QRDI 2030) to transform and enhance the RDI ecosystem (Figure 106).

**Figure 106. Seven Transformation Drivers of the QRDI 2030**

| Scientific Research | Innovation | RDI Talent | RDI Funding | RDI Governance | RDI Regulatory Environment | RDI Information Systems |
|---|---|---|---|---|---|---|
| Academic and research institutions that produce new knowledge and technologies and contribute to building the next generation of scientists and engineers | Business and government that can develop, adapt and deploy R&D based solutions for economic and societal impact | A strong base of domestic and foreign RDI talent that drives research and innovation in Qatar | Sustained and well-balanced RDI funding that enables the realization of transformation objectives resulting in a healthy mix of public and private RDI activities | Governance that enables strategic alignment of RDI activities, swift decision making, responsible allocation of RDI funding, effective monitoring and flexibility to course-correct in a timely manner | The right policies and regulations to encourage and support mobility of ideas, talent and capital, and the conduct of ethical and safe RDI activities | Information systems and knowledge platforms that enhance synergies, provide transparent access at the appropriate levels, optimize resources, and enable evidence-based decisions |

Source: QRDI Council, QRDI 2030

**The strategy has identified five areas where Qatar has the potential to develop a critical mass in RDI: energy, health, resource sustainability, society, and digital technology**

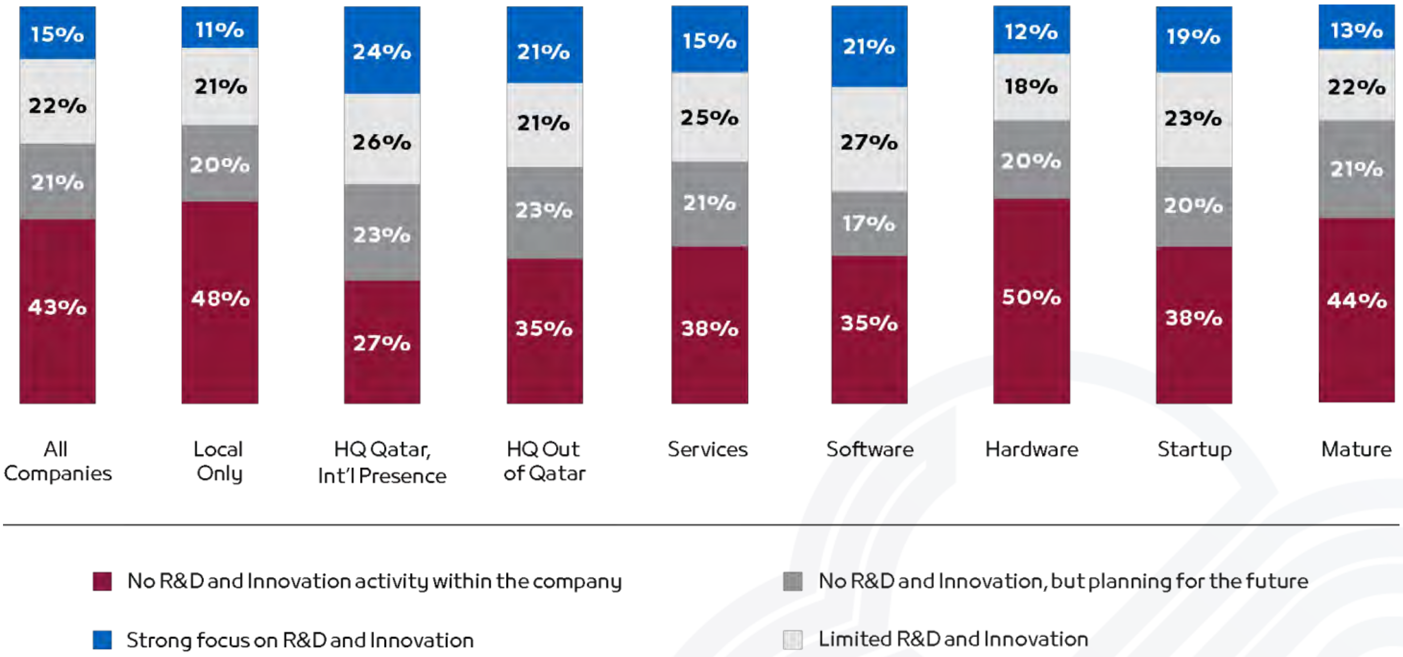
The latter area identified by the QRDI is of particular importance for the ICT sector, as the strategy also aims to develop and implement an improved RDI funding policy to provide increased access to government funding and to further support growth of the ecosystem. Strategy implementation is already through its first phase of funding national champions to engage with startups and stimulate innovation. Furthermore, the strategy also seeks to support the talent gap in Qatar and has three related strategic objectives: prepare Qatar's students to pursue RDI careers; develop, attract, and retain qualified product development talent, research scientists, and engineers; and to develop, attract, and retain qualified innovation talent. These initiatives will help Qatar fill its talent gap and increase development of its national RDI.

Other important innovation initiatives are driven by public or quasi-public entities; for example, the Qatar Foundation (QF) and partnering universities have established multiple research centers, including the Qatar Computing Research Institute (QCRI)[156] which operates under the umbrella of the Hamad bin Khalifa University. The Foundation also supports and promotes other R&D and innovation initiatives such as the Qatar Science and Technology Park (QSTP), the country's premier hub for applied research, technology innovation, and incubation. QSTP, as well as MCIT's TASMU Digital Valley, play an important role in facilitating a more interconnected and vibrant innovation ecosystem by bringing together resources and market players. Two other MCIT initiatives, the Digital Incubation Center[157] and TASMU Innovation Lab, are also driving government-led innovation.

Despite the government's push for innovation, private sector involvement remains marginal at best, thus creating a potential disconnect between knowledge creation and the market. Interviews with multiple ICT stakeholders highlighted the need for more active public-private partnerships, contributions to National Champions[158] and to incubation and acceleration programs.

## 8 – In ICT specifically, less than 40% of the surveyed companies currently engage in R&D and innovation activities, but a large share have plans to launch RDI initiatives

**Figure 107. R&D and Innovation Activities of ICT Companies (Overall and By Type of Business) (% of respondents)**



n = 362
Source: CRA ICT Sector Survey 2022

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[156] Operating under the umbrella of the homegrown Hamad Bin Khalifa University

[157] Led by the Ministry of Communications and Information Technology

[158] Large local companies with international reach, often publicly owned (e.g., Al Jazeera, Ooredoo, Qatar Airways, beIN, etc.)

According to the CRA ICT Survey 2022, approximately 37% of surveyed companies currently engage in some form of R&D and innovation activity, with 15% claiming a strong focus on R&D. Businesses with international exposure[159] tend to be more active in innovation (Figure 107). In particular, companies headquartered in Qatar but also serving other markets engage more in RDI than local companies focused exclusively on the local market, suggesting that more innovative companies have a higher probability of being able to export. Similarly, software companies and startups seem to be more likely to carry out some innovation than mature companies and companies focused on hardware. One third of companies that do not carry out any R&D and innovation activities plan to do so in the near future, indicating growing potential for innovation in the sector.

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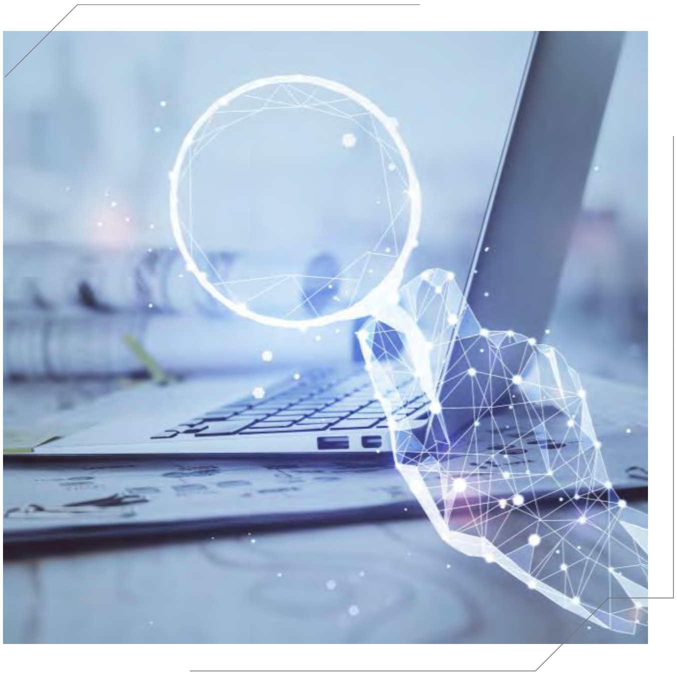
[159] Companies that do not only serve Qatar; includes both companies with headquarter in Qatar and companies with headquarter abroad

# 6

# Appendix



# Primary Research Methodology

The objective of the primary research was to establish a comprehensive understanding of Qatar's ICT market leveraging three main sources of data:

- A standard survey of ICT businesses operating in Qatar
- In-depth interviews with industry stakeholders from the private and public sectors, and wider ecosystem
- Workshops and roundtable discussions with key ICT stakeholder segments

The primary research phase ran between March and September 2022.

# Phase 1: Quantitative Research

## The standard survey

The comprehensive survey was conducted with the objective of collecting data on a number of indicators and information areas covered in this report. This research also helped create a database of ICT companies operating in Qatar and provided visibility on the activities conducted by these businesses, coherently within the CRA's ICT classification. The list of companies has been populated based on data from licensing platforms in Qatar (including MOCI, QFC and QFZ) and other government entities (such as MCIT); extensive checks have been conducted to filter out inactive companies.

The surveyed sample included companies that are active and legally registered in Qatar from both the IT and communications technology (i.e., telecommunications) segments, and Qatar-headquartered and international companies. Furthermore, the sample encompasses companies of different sizes and maturity levels to ensure maximum representation of the total ICT sector.

More than 1,400 entities were invited to respond to the survey, which represents the virtual entirety of ICT companies in Qatar. The final sample of valid responses received totaled 362, well above the required representative sample size of 278. Throughout the analysis, the sample was at times further segmented by the geographical type of the companies, rheir size, level of maturity and main activities performed to derive valuable segment-specific insights and/or note differences between segments.

The polling was conducted through an online questionnaire as well as face-to-face depending on the preference of the respondent.

**Table 4. Standard Survey Methodology**

| **Quantitative Phase – Standard Survey** | |
|---|---|
| **Sample size and composition** | • >1,400 companies invited to take the survey<br>• 362 valid responses received<br>• Only active companies were targeted<br>• Companies had to be legally registered in Qatar<br>• Sample consisted of IT and telecommunications companies<br>• Mature companies and startups were included in the sample<br>• Companies of different sizes were included in the sample<br>• Both locally-headquartered and international companies were targeted<br>• Respondent profile included business owners, ICT managers/decisionmakers |
| **Methodology** | • 36 multiple choice/scaled questions<br>• Collection via online questionnaire supported by face-to-face interviews and phone calls |

# Phase 2: Qualitative Research

### Stakeholder interviews

The interviews were a discovery-oriented research tool used to explore the points of view, experiences and perspectives of different industries' stakeholders concerning the dimensions covered in this report. These interviews allowed the CRA to gather a qualitative, deeper understanding on the topics which were quantitively measured through the survey. The interviews provided a holistic view of the ICT sector from the supply side in addition to insights on the demand side.

Interviewed stakeholders included large ICT players active in Qatar (both national and international), ICT and digital economy startups, relevant public sector entities (e.g., ministries, licensing platforms), research and innovation hubs and programs, and major national champions driving demand (i.e., companies heavily investing in ICTs and digitalization). Forty interviews were conducted with selected and highly-experienced professionals, shortlisted based on their profile including sector, role/position in the organization (seniority level), relevant expertise and further background factors.

Table 5. Interviews Approach

| **Qualitative Phase — Interviews** | |
|---|---|
| **Number** | • 40 interviews |
| **Sample composition** | • Selected entities operating in Qatar<br>– Large ICT players<br>– ICT/digital economy startups and SMEs<br>– Government entities<br>– R&D and innovation players<br>– ICT investors<br>– National champions (ICT buyers)<br>• Selected subject matter experts and senior professionals |
| **Methodology** | • One-on-one interviews<br>• Open-ended and discovery-oriented questions on key research topics |

### ICT workshops and roundtable discussions

Insights built through the quantitative survey and interviews have been supported by a series of themed workshops and group sessions designed to gather representatives from different stakeholder segments and capture comprehensive insights through comprehensive, topic-specific discussions. The desired outcomes from this research method were to understand the ICT landscape from the perspective of different players, and to gauge the feasibility of various solutions and strategies aimed at stimulating growth in the sector. One roundtable discussion and three workshops were conducted which saw the participation of key professionals from organizations that were later selected for the one-to-one stakeholder interviews (e.g., ICT senior executives, executives from other industries but relevant for the sector such as buyers and key government nodes).

Table 6. Workshops Approach

| **Qualitative Phase — Workshops** | |
|---|---|
| **Number** | • 1 roundtable discussion and 3 workshops |
| **Sample composition** | • Relevant ecosystem stakeholders<br>– Large ICT players<br>– ICT/digital economy startups and SMEs<br>– Government entities<br>– R&D and innovation players<br>– ICT investors<br>– National champions (ICT buyers)<br>• Selected and highly-experienced ICT professionals within these entities (e.g., senior executives, government nodes)<br>• >133 PPI attended at least one of workshops |
| **Topics** | • IT roundtable with MCIT Minister participation<br>• ICT R&D and Innovation<br>• Enablers of Qatar's ICT Sector<br>• ICT Value Chain Localization |
| **Methodology** | • Group discussions, with targeted questions to prompt insightful conversations |

# Sector Contribution to GDP

In assessing the contribution of Qatar's ICT sector to national GDP, some key considerations had to be made:

- The granularity of official economic data available at the time of analysis does not permit the computation of GDP contribution for ICT as per the sector-specific taxonomy as defined in the ICT classification document. Therefore, the Information and Communication sector is defined by Section J of the ISIC rev. 4 classification as the closest proxy for ICT sector in the context of this research. The sector contribution value has been calculated based on the data published by Qatar's Planning and Statistics Authority which uses ISIC rev. 4 to report GDP and other economic data.
- Two possible approaches have been explored using nominal or real GDP to measure the contribution to the economy of the ICT sector. This report mainly focuses on real GDP-based measurement as this was found to be more relevant to the sector's value-added net of inflation and net of changes in price of oil and gas, which in the case of Qatar are core determinants of the country's nominal GDP.
- To allow for more significant comparison with non-oil and gas-based economies, the report focuses on the ICT contribution to the real non-hydrocarbon GDP. This measure is considered a better, more solid baseline to measure sector growth on upcoming research cycles. Non-hydrocarbon GDP is approximated by total GDP minus the value added of the Mining and Quarrying sector (ISIC rev. 4 Section B).
- Sector contribution in this report is calculated based on both real GDP at 2018 prices (published by Qatar's Planning and Statistics Authority) and on real GDP at 2015 prices (published by external sources - Oxford Economics) for consistent cross-country comparison (as the OECD currently reports real GDP at 2015 prices).

Below is a view of the main GDP measures for the ICT sector (approximated by ISIC rev. 4 Section J) in Qatar (Table 7, Table 8)

**Table 7. Contribution of Qatar's Information and Communication Sector to Nominal GDP**

| ICT Sector Contribution Based on Qatar's Nominal GDP at Current Prices | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|
| Total GDP (QAR mn) | 552,305 | 586,401 | 667,339 | 641,991 | 525,657 | 654,025 |
| Non-Hydrocarbon (NHC) GDP (QAR mn) | 388,322 | 386,996 | 407,141 | 412,669 | 373,314 | 413,273 |
| Information & Communication | 9,810 | 9,580 | 9,618 | 9,531 | 9,566 | 10,288 |
| Information & Communication (% of total GDP) | 1.8% | 1.6% | 1.4% | 1.5% | 1.8% | 1.6% |
| Information & Communication (% of NHC GDP) | 2.5% | 2.5% | 2.4% | 2.3% | 2.6% | 2.5% |

Source: PSA, National Accounts 2020 (Year 2016 data), Window on Economic Statistics of Qatar, April 2022, 39th Issue: Q4 2021 (2017-2021 data)

**Table 8. Contribution of Qatar's Information and Communication Sector to Real GDP (2018 prices)**

| ICT Sector Contribution Based on Qatar's Real GDP at 2018 Prices | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|
| Total GDP (QAR mn) | 669,221 | 659,199 | 667,339 | 671,932 | 648,027 | 658,338 |
| Non-Hydrocarbon (NHC) GDP (QAR mn) | 402,160 | 398,185 | 407,141 | 416,052 | 397,366 | 408,388 |
| Information & Communication | 9,686 | 9,460 | 9,618 | 10,218 | 10,417 | 10,973 |
| Information & Communication (% of total GDP) | 1.4% | 1.4% | 1.4% | 1.5% | 1.6% | 1.7% |
| Information & Communication (% of NHC GDP) | 2.4% | 2.4% | 2.4% | 2.5% | 2.6% | 2.7% |

Source: PSA, National Accounts 2020 (Year 2016 data), Window on Economic Statistics of Qatar, April 2022, 39th Issue: Q4 2021 (2017-2021 data)

# List of Acronyms

| | |
|---|---|
| **3D** | 3-Dimensional |
| **5G** | 5th-Generation Mobile Network |
| **AI** | Artificial Intelligence |
| **API** | Application Programming Interface |
| **B2B** | Business-to-Business |
| **B2C** | Business-to-Consumer |
| **BERD** | Business Expenditure on Research and Development |
| **bn** | Billion |
| **CAGR** | Compound Annual Growth Rate |
| **CapEx** | Capital Expenditure |
| **CCQ** | Community College of Qatar |
| **CMU** | Carnegie Mellon University in Qatar |
| **CoE** | Center of Excellence |
| **CRA** | Communications Regulatory Authority |
| **CT** | Communication Technology |
| **DLT** | Distributed Ledger Technology |
| **DVC** | Doha Venture Capital |
| **ET** | Emerging Technology |
| **FDI** | Foreign Direct Investment |
| **FIFA** | Fédération Internationale de Football Association |
| **GCC** | Gulf Cooperation Council |
| **GDP** | Gross Domestic Product |
| **GII** | Global Innovation Index |
| **HBKU** | Hamad Bin Khalifa University |
| **HQ** | Headquarters |
| **ICT** | Information Communication Technology |
| **ICV** | In-Country Value |
| **IDC** | International Data Corporation |
| **IMD** | International Institute for Management Development |
| **IMF** | International Monetary Fund |
| **IOT** | Internet-of-Things |
| **IPAQ** | Investment Promotion Agency of Qatar |
| **IPv4** | Internet Protocol version 4 |
| **IPv6** | Internet Protocol version 6 |
| **IT** | Information Technology |
| **ITU** | International Telecommunication Union |
| **IXP** | Internet Exchange Point |
| **KPI** | Key Performance Indicator |
| **KSA** | Kingdom of Saudi Arabia |
| **LNG** | Liquified Natural Gas |
| **M&A** | Merger and Acquisition |
| **MCIT** | Ministry of Communication and Information Technology |
| **MENA** | Middle East and North Africa |

| | |
|---|---|
| **ML** | Machine Learning |
| **mn** | Million |
| **MOCI** | Ministry of Commerce and Industry |
| **MOTC** | Ministry of Transportation and Communication |
| **MOU** | Memorandum of Understanding |
| **MSME** | Micro, Small and Medium Enterprises |
| **NCSA** | National Cyber Security Agency |
| **NDS** | National Development Strategy |
| **O&G** | Oil and Gas |
| **OECD** | Organization for Economic Co-operation and Development |
| **PPP** | Purchasing Price Parity |
| **PSA** | Ministry of Development Planning and Statistics |
| **QAR** | Qatari Riyal |
| **QCRI** | Qatar Computing Research Institute |
| **QDB** | Qatar Development Bank |
| **QF** | Qatar Foundation |
| **QFC** | Qatar Financial Centre |
| **QFZ** | Qatar Free Zone |
| **QFZA** | Qatar Free Zone Authority |
| **QMIC** | Qatar Mobility Innovations Center |
| **QNB** | Qatar National Bank |
| **QNBN** | Qatar National Broadband Network |
| **QNV 2030** | Qatar National Vision 2030 |
| **QoS** | Quality of Service |
| **QRNF** | Qatar National Research Fund |
| **QSTP** | Qatar Science and Technology Park |
| **R&D** | Research and Development |
| **RDI** | Research, Development, and Innovation |
| **SME** | Small and Medium Enterprise |
| **TIT** | Traditional Information Technology |
| **TMT** | Telecommunications, Media, and Technology |
| **T** | Trillion |
| **TV** | Television |
| **UAE** | United Arab Emirates |
| **UK** | United Kingdom |
| **UNCTAD** | United Nations Conference on Trade and Development |
| **USD** | United States Dollar |
| **VC** | Venture Capital |
| **VSAT** | Very-Small-Aperture Terminal |
| **WEF** | World Economic Forum |
| **XaaS** | Anything as a Service |
| **XR** | Extended Reality |

# Definitions

The following tables provide further clarification around ICT classification. Category 1 (Table 9) consists of three main segments for Information Technology ("IT") and one segment for Communications Technology ("CT").

Table 9. Category 1 Classification

| | Category 1 | Clarification |
|---|---|---|
| IT[160] & ET | Services | Any value chain activity in ICT-specific services (R&D/service packaging/sales & marketing/after sales support) |
| | Software (including platforms) | Any value chain activity (R&D/development/sales & marketing/after sales support & service activities) in applications, applications deployment and development, and infrastructure software |
| | Hardware (including infrastructure) | Any value chain activity (R&D/manufacturing/sales & marketing/after sales support & service activities) in devices, and infrastructure equipment/other) |
| CT | Telecommunications services | Any value chain activity (R&D/manufacturing/sales & marketing/after sales support & service activities) in telecommunications, including fixed/mobile/other infrastructure or data/voice providers |

Source: Internal analysis

Table 10 below provides the definitions for business activities under Information Technology Services (Category 1), across five Category 2 classifications.

Table 10. Services Classification and Definition

| Category 1: Services | |
|---|---|
| **Category 2** | **Category 2 Definition** |
| Traditional IT Managed Services | Long-term, contractual arrangement in which a service provider takes ownership of managing all or part of a client's information systems infrastructure and operations based on a service-level agreement |
| Traditional IT Project-Oriented | Project-based IT services to 1) develop customized code sets to meet a client's business needs, 2) improve organizational IT performance and 3) deliver technical solutions that address an organization's specific technical or business needs |
| Traditional IT Support Services | IT support that helps to install and deploy hardware and software as well as IT education/training |
| Other Traditional IT services | Other traditional IT services |
| Emerging Technology (ET) Specific Services | Services related to the seven Emerging Technology (ET) areas identified for the IT sector (Emerging Technologies are innovative technologies that have been recently developed, are under development or will be developed within the next few years and that are creating or are expected to create significant social or economic effects) |

Source: IDC, Internal analysis

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[160] IT covers traditional Information Technology (Traditional IT)

Table 11 below provides definitions for business activities under Information Technology Software (Category 1), across four Category 2 classifications.

**Table 11. Software Classification and Definition**

| **Category 1: Software (including Platforms)** | |
|---|---|
| **Category 2** | **Category 2 Definition** |
| **Traditional IT Application Development and Deployment** | Tools and platforms used primarily by developers to build, test and deploy software as well as process, govern and analyze data |
| **Traditional IT Applications** | Commercial, industrial and technical programs and code sets designed to automate specific sets of business processes in an industry or business function and make groups or individuals in the organization more productive or support education or data processing in personal activities |
| **Traditional IT Infrastructure Software** | Software solutions that provide the basic foundational layers of software that enable bare metal infrastructure hardware resources to host higher-level application development/deployment software/application software and provide virtualization/management software and share the use of those resources |
| **Emerging Technology (ET)-Specific Platforms and Software** | Platforms and software related to the seven Emerging Technology (ET) areas identified for IT sector (Emerging Technologies are innovative technologies that have been recently developed, are under development or will be developed within the next few years and that are creating or are expected to create significant social or economic effects) |

Source: IDC, Internal analysis

Table 12 below provides definitions for business activities under Information Technology Hardware (category 1), across four Category 2 classifications.

**Table 12. Hardware Classification and Definition**

| **Category 1: Hardware (including Infrastructure)** | |
|---|---|
| **Category 2** | **Category 2 Definition** |
| **Traditional IT Devices** | Instruments that use electric current to encode, analyze or transmit information |
| **Traditional IT Infrastructure** | Hardware needed for network or server/storage |
| **Other Traditional IT Hardware and Infrastructure** | Other hardware which does not fit traditional IT Devices or Infrastructure |
| **Emerging Technology (ET)-Specific Hardware and Infrastructure** | Hardware and Infrastructure related to the seven Emerging Technology (ET) areas identified for IT sector (Emerging Technologies are innovative technologies that have been recently developed, are under development or will be developed within the next few years and that are creating or are expected to create significant social or economic effects) |

Source: IDC, internal analysis

Table 13 below provides definitions for business activities under Communications Technology, across three Category 2 classifications.

Table 13. Telecommunications Services Classification and Definition

| Category 1: Telecommunications Services | |
|---|---|
| **Category 2** | **Category 2 Definition** |
| **Fixed** | Wired telecommunications service |
| **Mobile** | Wireless telecommunications service |
| **Other** | Mainly Non-Terrestrial Network (NTN) including HAPS, LEO and satellites among others |

Source: IDC, internal analysis

Communications
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