Islamic Republic of **Iran**

سازمان توسعه تجارت ایران
Trade Promotion Organization of Iran

National Export Strategy 2021-2025

Information and Communi-cations Technology Strategy

Building the knowledge-based economy and connecting Iran to strategic markets

This Information and Communications Technology (ICT) Strategy was developed as part of the National Export Strategy of Iran on the basis of the process, methodology and technical assistance of the International Trade Centre (ITC) within the framework of its Trade Development Strategy programme.

ITC is the joint agency of the World Trade Organization and the United Nations. As part of ITC's mandate of fostering sustainable development through increased trade opportunities, the Research and Strategies for Exports section offers a suite of trade-related strategy solutions to maximize the development pay-offs from trade. ITC-facilitated trade development strategies and roadmaps are oriented to the trade objectives of a country or region and can be tailored to high-level economic goals, specific development targets or particular sectors, allowing policymakers to choose their preferred level of engagement.

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International Trade Centre

Islamic Republic of **Iran**

National Export Strategy 2021-2025

Information and Communications Technology Strategy

Building the knowledge-based economy and connecting Iran to strategic markets

FOREWORD
BY THE MINISTRY OF INDUSTRY, MINE, AND TRADE

Non-oil exports have become increasingly important to Iran in recent years. Increasing international trade is not only a means of boosting economic growth and the nation's welfare, but also contributes to strengthening international relations and the stabilization of economic and political affairs by paving the way for reinforcing friendly relations based on mutual interests with a wide range of trade partners. Trade is one of the most important forms of exchange between countries and fostering this will lead to connections such as foreign investments, scientific and technical exchanges, and cultural relations, all of which will contribute to the country's growth and prosperity in all respects. Hence, expanding trade would provide a basis for development in other areas of cooperation and is of great importance from this perspective. In addition to substantial investment to expand export potential, growing foreign trade requires strategic targeting as well as addressing constraints. In this context, Iran's Trade Promotion Organization developed a National Export Strategy (NES) with the support of the International Trade Center (ITC) that has similar experience in designing NES in more than 50 countries. The strategy is going to cover general trade-related factors such as ensuring export quality that is relevant to the export of all goods. It also addresses a number of sector-specific strategies in form of independent strategies. All activities in the framework of designing strategies have led to diagnosing sets of plans of actions in order to tackle issues and problems to facilitate export procedures.

The plan of actions indicated in the strategies will be implemented by I-TPO in close collaboration with national stakeholders during the next 5 years and I-TPO will enjoy ITC support during the implementation period.

I would like to thank each and every entity from the private sector, distinguished exporters as well as managers and exports from various ministries and institutions who have contributed to the development of the NES and sincerely appreciate their contributions. Also, the initiative would not be successful without supports from the European Union and the ITC. We hope all contributors to the designing of the NES would continue their support to the I-TPO during the course of implementation of the recommended actions so that we achieve the goals of this strategy in practice and we witness the export promotion of non-oil exports in our country.

Ministry of Industry, Mine, and Trade

FOREWORD
BY IRAN'S TRADE PROMOTION ORGANIZATION

The ITPO signed a Memorandum of Understanding with the International Trade Centre (ITC) in 2016 in order to benefit from its expertise in expanding non-oil exports. One of the most important clauses of this MOU concerned the development of the NES. Implementation of the memorandum materialized after the European Union (EU) made a fund available for the ITC to provide technical assistance to ITPO in 2018. The NES development process started at the beginning of the Iranian year 1398 (April 2019), enjoying the technical assistance of the ITC as well as the contribution of international experts. The result of the 1.5 years of cooperation is now being presented to you.

The following points as regards these documents are worth mentioning:

- The NES has been developed in collaboration with the public and private sectors, relying on the expertise of the ITC. In fact, public and private stakeholders in each sector were consulted by the experts of the ITC in the process of designing the NES and, therefore, the results are agreed upon by these entities. Reaching such a consensus on non-oil exports is unprecedented and thus the proposed plans of actions in the NES are of great importance.
- Around 500 key participants from the production and export sectors of the country have been consulted by the expert group of the ITPO and the ITC during the process of NES preparation.
- While proposed solutions envisaged in the document address Iran's specific problems, they also make use of worldwide experience and international expert's viewpoints.
- Independent International consultants have been consulted in addition to the ITC experts and their views have been reflected in the documents.
- International experts' field visits to production and export chains and sites played a key role in understanding the current situation and designing the NES.
- The implementation of planned activities of the NES will take several years and require the support of the ITC and international experts.
- Through the process of the NES development in each sector, a set of reviews, consultation with stakeholders, and also field visits were organized and strategic objectives were set in order to address problems and remove constraints at the first step; then, operational objectives were set under each strategic objective; after that, relevant activities were designed under each operational objective; and finally, a leading entity and its partners were listed for each activity. More than 350 actions have been designed in total. We expect that non-oil exports to be revolutionized as a result of the implementation of this plan of action. More information regarding the NES and expert recommendations are listed in the following table:

Sectors	Strategic Objectives	Operational Objectives	Activities
Fruits and Vegetables	3	11	47
Medicinal Herbs	3	13	40
Tourism	3	11	41
ICT	3	15	50
Auto parts	3	8	29
Petrochemicals	4	12	33
Trade information and Promotion	3	7	35
Quality Management	3	15	56
Entrepreneurship	3	10	28
Total	28	102	359

- The NES has been developed with the goals of:
  - » Fostering coherence and coordination between stakeholders at the sectoral and national levels;
  - » Elaborating a comprehensive approach to removing constraints and expanding exporting in priority sectors;
  - » Identifying and addressing exporters' needs for support services;
  - » Supporting the SMEs throughout the export process;
  - » Providing necessary training in priority sectors with the support of national and international experts;
  - » Developing export promotion and branding;
  - » Making effective use of ICT in export-oriented marketing; and
  - » Identifying and assigning appropriate entities for the implementation of the designed activities in the NES.

The design of the NES would not have been possible without the support of the ITC and its experts, who have experience in designing export strategies in more than 50 countries. The NES is also the result of cooperation between representatives of 17 national ministries and various organizations and stakeholders with mandates related to the promotion of non-oil exports. This collaboration benefitted the design of the NES. Also, the process enjoyed the network and sincere cooperation of Iran's Chamber of Commerce, Industry, Mine, and Agriculture in inviting the private sector to participate in consultation meetings and as a result, a large number of the private sector and associations' representatives and a variety of stakeholders were engaged. None of this would have taken place without the support of the EU and its work on "Trade for All" that is promoting economic and trade relations between countries as the best way to secure worldwide stability and peace.

Therefore, the ITPO, for its part, appreciates all entities and individuals who contributed to the designing of the NES. We hope to be privileged to have support from all actors in the implementation phase of the NES. Like the designing of the document that has resulted from the contribution of a wide range of national and foreign institutions and individuals, its implementation also could not happen without relying on all of those actors. Therefore, the ITPO, during the implementation phase, will seriously maintain and strengthen the established mechanisms and networks built during the course of the NES development. We hope that this move proves to be a big step towards the promotion of the non-oil export of the country and contributes to the improvement of the Iranian nation's living standards.

Iran's Trade Promotion Organization


MacBook Pro

FOREWORD
BY THE INTERNATIONAL TRADE CENTRE

Iran's place between east and west has long put it in a pivotal position in global trade. With natural resources, a rich tourism offer, high-quality agricultural products and a well-rooted manufacturing industry, the country is well positioned to take the next step toward greater trade-led growth.

The country has the potential to leverage its assets to become a centre of innovative digital solutions. With its highly-educated and productive labour force and investment attractiveness Iran could position itself to be a major exporter to markets across the region and around the world.

These strengths have been cultivated in a challenging external context. But there have also been clear domestic constraints which have contributed to impeding the realization of Iran's potential for growth. However, the need to build greater economic resilience, especially with the impact of global pandemics, has taken centre stage.

Against this backdrop, Iran has developed its new National Export Strategy (NES). The document reflects a growing consensus on the need to focus on trade-led growth to complement domestic resilience.

Trade-led success will require consistent and organized efforts. In developing the strategy, key actors have acknowledged the need to tackle the private sector's critical challenges. The NES proposes tailored solutions and leverages the country's strengths and competitive advantages.

During the consultations for this NES, all stakeholders recognized the need for further policy convergence and stronger coordination at the level of institutions if the country was to move forward. This coherence is at the core of the NES – joining forces toward a shared vision and making strategic choices that further develop the economy. The NES provides a framework for setting priorities, coordinating action and defining concrete steps. It was designed through analysis and consultation involving hundreds of voices from across the public and private sectors and input from international market experts.

The International Trade Centre (ITC) commends the leadership of the Ministry of Industry, Mine and Trade, the Iran Trade Promotion Organization and applauds the enthusiastic involvement of the private sector in the design of this strategy. ITC will continue to support Iran to ensure that the objectives of the NES are attained rapidly to support greater inclusive, sustainable, and resilient development.

Finally, ITC wishes to thank the European Union for its support to this initiative as part of its EU-Iran Trade Development project.

Pamela Coke-Hamilton
Executive Director of the International Trade Centre

ACKNOWLEDGMENTS

The Information and Communications Technology (ICT) Strategy forms an integral part of Iran's National Export Strategy (NES). It was developed under the aegis of the Islamic Republic of Iran and the leadership of the Ministry of Industry, Mine and Trade (MoIMT) and the Trade Promotion Organization of Iran (ITPO), in close collaboration with the Ministry of Agriculture Jihad (MoAJ). This strategy was elaborated thanks to the technical assistance of the International Trade Centre (ITC) and falls under the framework of the project "European Union (EU) – Iran Trade Development: Trade-Related Technical Assistance, capacity building, and value chain development for inclusive and sustainable trade-led growth in Iran".

The document benefited particularly from the inputs and guidance provided by the sector stakeholders that steered the formulation of the strategy, namely:

Institutions / Natural and Legal Persons
Ministry of Information and Communications Technology
• Deputy of Strategic Supervision- Information Technology Organization
• Deputy of National Network- Information Technology Organization
• Office of Strategic Planning and Supervision- Information Technology Organization
• Directorate- General for Legal Affairs- Information Technology Organization
• Directorate- General for Communications- Information Technology Organization
• Communications Regulatory Authority
Office for Business Development- Vice Presidency for Science and Technology
Center for Progress and Development of Iran
Iran Computer Games Foundation
Iranian ICT Guild Organization
ICT Commission- Iran Chamber of Commerce, Industries, Mines and Agriculture
Representatives of companies active in ICT sector
Office of Service Export- ITPO
Institute For Trade Studies and Research

Technical support and guidance from ITC was rendered by the following people:

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• Mr. Mirhadi Seyedi	ITC representative in Iran	ITC
• Mr. Majid Bahrami Forouzan	ITC representative in Iran	ITC
• Mr. Mehdi Yaghoubi	Media support consultant	ITC

NOTE TO THE READER

The Iran NES was developed on the basis of a participatory approach, during which more than 400 Iranian industry leaders, small business owners, farmers and public sector representatives held consultations to reach consensus on key sector competitiveness issues and priority activities. These inclusive consultations were held in Tehran and in some sector-specific regions, including Kerman, Yazd and Isfahan.

Besides in-depth research and value chain analysis, these consultations were complemented by:

- Site visits where supply chain assessments were carried out to gain further knowledge on key issues such as quality procedures, technical skills, lean management, quality of raw materials and access to markets, etc.
- Interviews with domestic, regional and international buyers to guide the NES with strategic insights and market intelligence as well as buyers' requirements in terms of quality standards, food safety, packaging, buying cycles, distribution channels and prices, etc.

The NES is aligned with existing national and sector-specific plans and policies and builds on ongoing initiatives in areas related to private sector development, regional integration, investment and economic empowerment of youth. Equally importantly, the NES initiative already accommodates budgeting to support implementation of critical pilot activities identified during the design process. This will ensure that impact and momentum are generated from early on, and support further resource mobilization and confidence-building.

The principal outputs of the Iran NES design initiative are endorsed, coherent and comprehensive export strategy documents with a five-year detailed plan of action (PoA) and implementation management framework. These documents include:

I. A main NES document, which contains trade support functional strategies, offering critical support across value chains and acting as enablers for sector development;
II. Individual NES priority sector strategies packaged as separate documents, but in alignment with the main NES findings and overarching strategic objectives.

NES Iran	Main NES document including trade support functional strategies: • Quality management • Trade information and promotion • Entrepreneurship
	Individual NES priority sector documents: • Fruits and vegetables • Medicinal herbs • Information and communication technology (ICT) • Tourism • Petrochemicals • Automobile parts

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ACRONYMS AND ABBREVIATIONS

EMC	Export management companies
Fintech	Financial technology
ICT	Information and communications technology
IMI	Industrial Management Institute
IROST	Iranian Research Organization for Science and Technology
IT	Information technology
ITC	International Trade Centre
ITO	Information Technology Organization of Iran
ITPO	Trade Promotion Organization of Iran
MoE	Ministry of Education
MoICT	Ministry of ICT
NES	National Export Strategy
SMEs	Small and medium-sized enterprises
UNCTAD	United Nations Conference on Trade and Development
VPST	Vice Presidency for Science and Technology

EXECUTIVE SUMMARY

Iran's ICT sector has seen rapid growth by leveraging the country's extensive pool of skilled workers and by exploiting opportunities in a largely isolated domestic market. The sector has the potential to grow further through exporting, if reforms to the business environment, improvements to human capital and enhancements to firm competitiveness can be made. This sector strategy document identifies relevant ICT sector trends, the strengths and potential of the Iranian sector, and the main constraints it faces as context for the challenges and opportunities shaping the direction of the way forward for the sector.

Globally, the ICT sector is a small, but growing contributor to economic activity and trade. Major producers, particularly the People's Republic of China, the Federal Republic of Germany and the United States of America, account for much of exporting. Opportunities on the international market still exist for Iranian firms, however, particularly in software development, as well as in e-commerce and financial technology (fintech). At the same time, markets for these products can also be further developed at home through progress on digital transformation, e-governance and information technology (IT) consulting.

The sector's performance and further potential have been supported by several underlying strengths and competitive advantages. Significant investment has fuelled a rapid expansion in ICT infrastructure, which has been fundamental to the sector's activities, domestic demand and the development of required skills. Relatedly, ICT access and use have grown to include much of Iran's population. The government's recognition of the sector's potential in terms of its direct economic contribution and as a leader in the development of a knowledge-based economy has been shown through its positioning in planning and policy. Iran's strong education system has prepared many workers with the kinds of skills needed to work in the sector, while the relatively low costs of labour also make the country a cost-competitive producer.

Cut off from participating in many aspects of the global ICT sector, Iran has developed a sizeable domestic sector, but one that has typically underperformed in exporting. E-commerce and fintech in particular have grown in the domestic market, and software developers have taken advantage of some international opportunities. Exports have thus been limited, but are growing; computer services exports accounted for just 0.7% of services exports in 2005, though this increased to 3% in 2015, when they were worth $338 million.

There is potential for further growth in both domestic and foreign markets. Even in the current context, reduced trade frictions and growing demand in key markets would be expected to contribute to improved exporting, particularly in China, the Republic of India, and the United Arab Emirates. The deep linkages between the ICT sector and other areas of the economy mean that significant spillovers can be expected from its further growth. In particular, a stronger ICT sector can help to push forward the digital transformation and productivity improvements in other areas of the economy.

The ICT sector's growth and potential – particularly in foreign markets – has been hampered by a number of unique constraints. Key institutions face capacity and organizational challenges. Despite the impressive pace at which growth in ICT access and use has occurred, significant gaps remain that limit the scale of the domestic market and hinder the sector's potential as a source of inclusive growth. Institutions and policies have not been adapted to the sector's needs. Technical and business skill gaps remain to be addressed. While the domestic market has fostered the sector's early growth, there has been a strong focus on this and limited support for exporting. Significant increases in investment are needed to expand capacities and competitiveness, but the needed support for this is not available and firms lack the needed access to finance. Support for start-up growth can be further strengthened to drive growth and innovation.

With consideration of the sector's context, strengths, potential and constraints, the strategy will work towards achieving the vision of "Building the knowledge-based economy and connecting Iran to strategic markets" through the ICT sector. This vision is to be realized through actions pursued under three strategic objectives.

Strategic Objective 1: Establish an enabling ecosystem for ICT SMEs and start-ups to thrive

Firms in Iran's ICT sector face many challenges in the business environment similar to those in other areas of the economy, but are also subject to constraints unique to their position in an emerging and knowledge-based sector. The strategy will work to improve their situation through actions on the policy environment, collaboration with the public sector, and exporting. The consolidation and monitoring of private and public plans for the sector will provide improved clarity for investment and policy coordination. Addressing regulatory gaps will reduce uncertainty and increase efficiency. Increasing public–private collaboration will bolster productivity and domestic demand. Actions to facilitate and incentivize software exports will help to establish a sector more aware of international opportunities.

Strategic Objective 2: Further develop skilled human capital and spur innovation

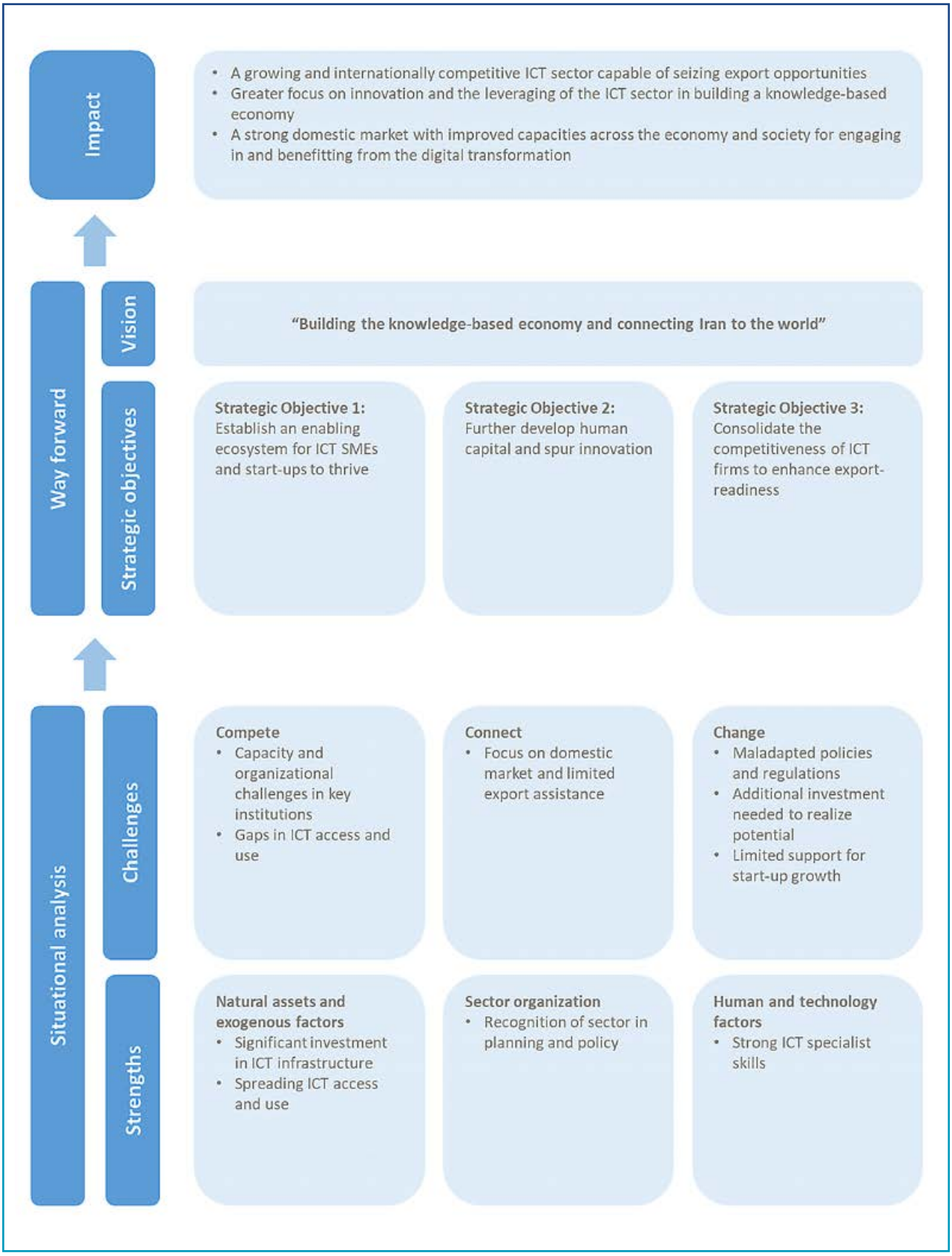
Skills are at the foundation of a successful ICT sector, and the strategy will address the need to grow and retain the pool of talent, strengthen capacities for building thriving businesses, and support the development of the skills needed to drive innovation in the sector. Actions to be taken under this objective will focus on retraining and upgrading the technical skills of current workers and increasing the number of graduates in related fields. Firms' business skills will be improved as well, particularly with regard to export capacities. Improvements to the quality of support for start-ups and small and medium-sized enterprises (SMEs) will be essential to this process. Finally, the strategy will support and encourage innovation in Iranian software development.

Strategic Objective 3: Consolidate the competitiveness of ICT firms to enhance export readiness

Moving into international markets will require ICT firms to become more competitive through enhancements to the quality and value of the services they offer. Assisting firms to expand certification by international standards will open new markets to exporting and allow for the development of higher-value products. In support of the sector's growth and innovation, action will be taken to attract investment, particularly in high-potential activities. Support for the growth and more intensive use of export management companies with services tailored to the sector's needs will help firms to overcome obstacles to trade. Actions will be taken under the strategy to build networks of firms engaged or capable of engaging in exporting. At the same time, promotion and awareness-raising activities in target markets will work to improve demand and lower exporting costs for Iranian firms. Support for firms in accessing these markets will also be prioritized.

The theory of change underlying the strategy is summarized in Figure 1.

Figure 1: Sector strategy theory of change



GLOBAL TRENDS IN SUPPLY AND DEMAND

- In which ICT subsectors do Iranian firms have the greatest potential to grow domestically and internationally? What is needed to develop the domestic market?
- What is the global context shaping supply, demand and trade in the ICT sector?

Generally, the potential for ICT-enabled exports goes far beyond traditional concepts of software development and business process management (BPM). The first wave of offshoring to countries like India and the Republic of the Philippines in the 1990s happened to be concentrated in labour-intensive activities like Y2K software remediation, call centres and back office processing. However, thanks to ICT, any knowledge product that can be digitized (e.g. design, engineering, medical know-how and legal services, etc.) can now be created remotely and delivered to customers anywhere in the world (Table 1).

Table 1: Conceptual framework for ICT export potential

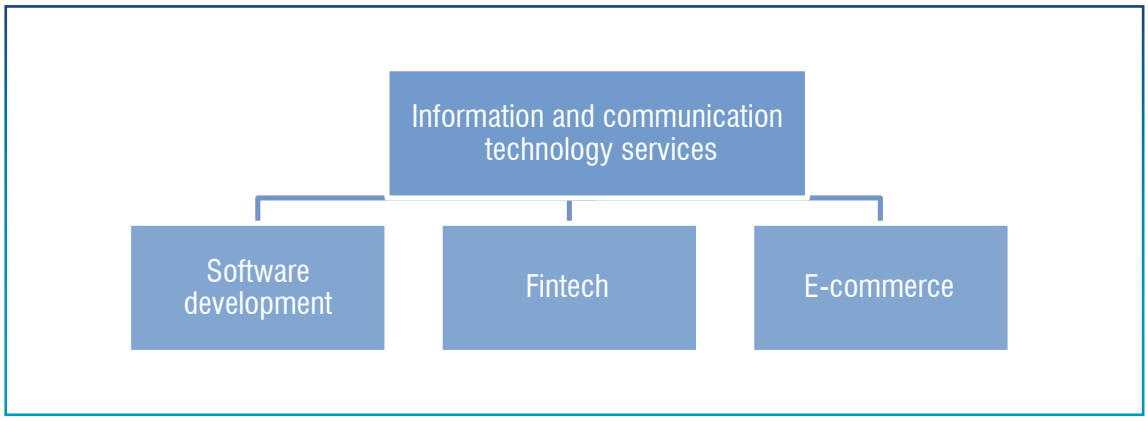
↓ Evolution over time	IT services	• Software coding/testing • Application integration • Technical support • Application hosting • Product development
	Transactional processing	• Data entry/accounts • Payment/receipt processing • HR management • Management information systems
	Research and analysis	• Data mining • Information research • Knowledge management • Analysis and projections • Modelling
	Contact centres	• Internal/external • Inbound/outbound • Sales and marketing • Correspondence • Mailings
	Engineering and design	• Engineering • Design • Architecture • Graphics • Advertising
	Content development	• Web design • Editing/translating • Writing • Animation and art • Audio/video
	Professional services	• Accountants/auditors • Travel services • Legal services • Consultants • Financial advisors
	Health and education	• Diagnostics • Clinical trials • Online education/training content and delivery

Source: ITC.

Iran has traditionally been an exporter of skilled engineers, doctors and financial managers, etc. to countries in the region and around the world. Given the country's traditional prowess in professional and technical fields (engineering, medicine, finance and law, etc.), the ultimate aim of Iran's ICT export strategy must be much more than pure software development and e-commerce. Iran should be using ICT-enabled channels to export high-end knowledge services (like medical diagnostics, accounting services, architecture and design, etc.) to its neighbours and global markets.

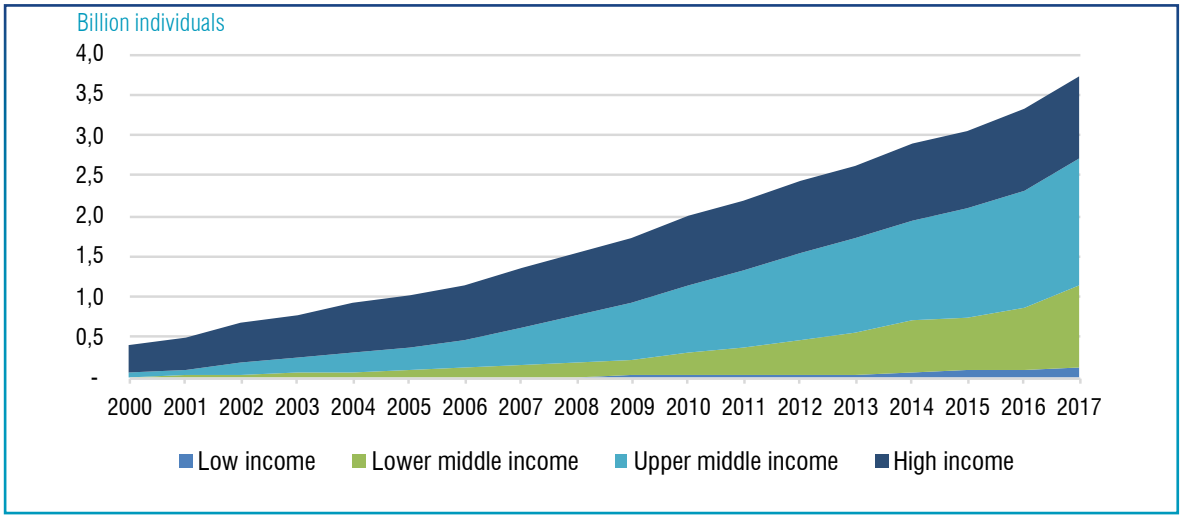
This strategy is concerned with promoting the growth and development of the ICT sector in Iran through exporting and the realization of domestic opportunities. In particular, it is focused on three high-potential subsectors of ICT services – software development, fintech and e-commerce (Figure 2). Domestic demand for these services is highly dependent on the country's process of digitalization, with the potential for local market development through digital transformation through ICT use in other sectors beyond e-commerce activities, e-government and IT consulting, such as the use of digital platforms in delivering non-digital services (i.e. the gig economy).

Figure 2: ICT sector and digital economy strategy focus areas



Digitalization is transforming the global economy, affecting countries at all income levels to some extent. In 2000–2017, the total number of global internet users increased form 399.2 million to 3.7 billion, with upper-middle income countries home to the most users (1.6 billion) (Figure 3). This process is creating increased demand for new services in software development, ICT services (including IT services, software solutions integrators, managed services resellers, telecoms operators, cloud service providers (CSP) and technological support services), distribution activities, other ICT-related businesses (such as business process outsourcing [BPO], knowledge process outsourcing [KPO] and business intelligence services), and e-commerce and fintech.

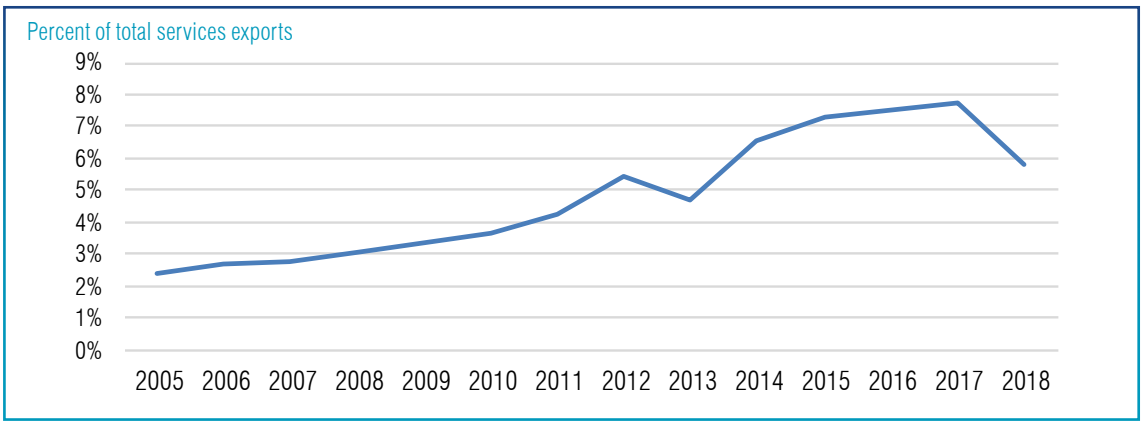
Figure 3: Global internet users by country income group (2000–17)



Source: World Bank, World Development Indicators.

Globally, exports of computer and information services have accounted for a small, but growing share of services exports. Despite a drop from 7.8% in 2017 to 5.8% in 2018, the share of exports from computer and information services has generally increased from the 2.4% level of 2005 (Figure 4). Most of this growth has been accounted for by the increased export share of computer services, which is also significantly larger.

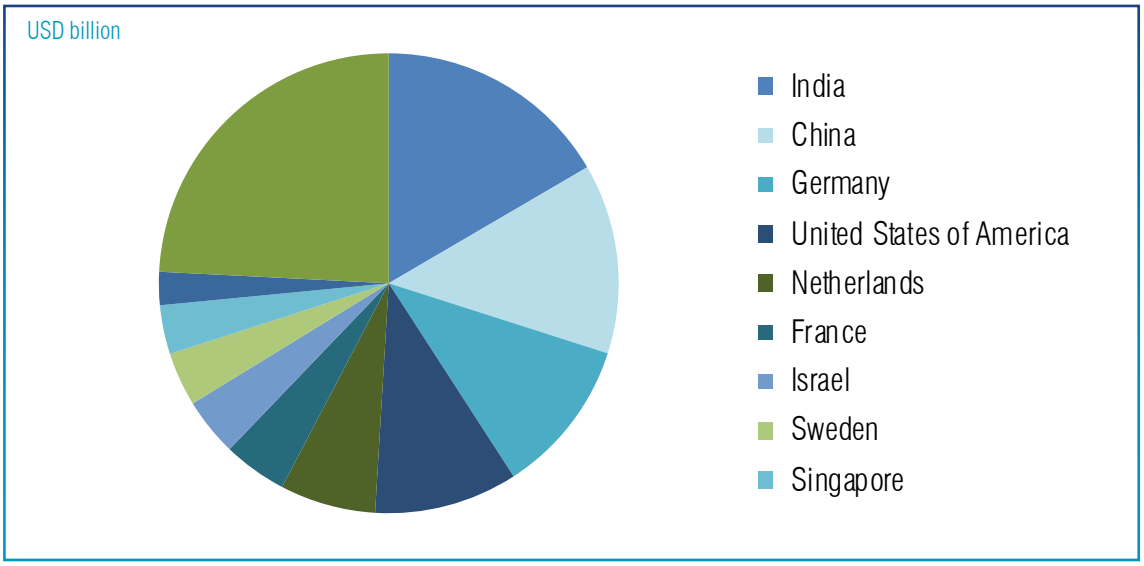
Figure 4: Global computer and information service exports (2005–18)



Source: ITC, Trade Map.

These exports are led by India, China, Germany and the United States, which, together, accounted for $171.6 billion in exports, or 50.9% of the world total (Figure 5). While still the leader in this sector, India's share of the global export market has been declining, from a high of 27% in 2010 to 16.6% in 2018, as a result of growth in China over time and a recent recovery in growth in Germany and the United States.

Figure 5: Computer and information service exports by exporter (2005–18)



Source: ITC, Trade Map.

Major technology and business trends affecting the global ICT sector include the growth of cloud computing and online storage, the spread of the internet of things (IoT), increasing use of data analytics and data mining, and growing use of robotic process automation (RPA).

- By offering information technologies as a service, cloud computing and online storage is an innovative business model that can reduce the upfront and maintenance costs to organizations of adopting digital solutions, and can offer flexible infrastructure. These traits can make cloud services particularly attractive and relevant to SMEs.

- By connecting smart physical objects to digital value networks and other modes of information sharing, the internet of things is a disruptive innovation and business model reducing costs for firms to connect, track and measure various activities along their value chains. As such, it facilitates digitalization and automation in areas such as production, logistics, administration and organization. Securely managing this data and responding appropriately does, however, pose new challenges at the same time.
- Data analytics and data mining is capable of improving monitoring, diagnostic, and analytical processes in a wide range of activities across society and the economy, including computer science, statistics, mathematics, logistics and others. In addition to new methods lowering costs in data collection and storage, it includes approaches for solving problems through the pre-processing, modelling, testing and reporting of data. The integration of data analytics and data mining into organizations' processes allows for improved flexibility and responsiveness, in addition to reduced costs in businesses processes.
- Robotic process automation is the use of software-based solutions to automate specific business practices. It can help businesses to improve productivity, enhance responsiveness and reduce errors. Robotic process automation (RPA) has been commonly applied to back office activities in particular.

Other, related activities are also growing alongside the ICT sector. For example, the creation of local content is an important form of value creation, particularly in growing markets where consumers are looking for national language and locally relevant content.

A key consideration for the strategy is how Iran can begin to develop ICT exports despite external restrictions and domestic constraints. Rather than ignoring their weaknesses, many countries have worked out how to turn them into sources of competitive advantage. For example, the Federative Republic of Brazil's history of hyperinflation in the 1970s and 1980s meant that local software firms had to develop particularly sophisticated transaction systems for local banks – Brazil's ICT sector has, therefore, focused its export promotion messaging around its distinctive competencies in developing ICT solutions for financial institutions (Table 2).

Table 2: Examples of countries that have turned weaknesses into sources of advantage

Country	Competitive challenge	Corresponding strategy
Brazil	• History of hyperinflation	• Distinctive competence in software for banks and financial services
India	• Brain drain of IT talent	• Leverage diaspora to market India's capabilities and bring business to India
Sri Lanka	• Small population, overshadowed by India	• Small and nimble, better suited for smaller companies and projects, prototyping new solutions • Tier-two Indian city costs with tier-one infrastructure
Singapore/Dubai	• High-cost • Small skill base	• Superior infrastructure and business environment for regional headquarters and business continuity • Open labour market policies to attract talent by hiring the best from anywhere
Egypt	• Challenge to overcome prevailing tourism image	• Leverage tourism language skills and strong engineering skills to become regional centre for high end multilingual technical support centres

Source: ITC.

Opportunities in foreign and domestic markets are greatest for Iranian ICT firms providing software, e-commerce and fintech services. Domestic markets for these products can be further developed through progress on digital transformation, e-governance and IT consulting. Iranian firms will have to contend with leading and emerging competitors in the sector, where trade remains limited, but is growing.

THE POTENTIAL TO EXPAND EXPORTING AND PREPARE FOR A MORE COMPETITIVE FUTURE

- What factors have driven the sector's success and should be leveraged in the strategy?
- How has the ICT sector contributed directly and indirectly to the growth of the Iranian economy?
- What potential is there in further developing ICT exports?

Iran's ICT sector is small, but growing rapidly, and the digital economy is becoming increasingly prevalent and important. General and specific factors are contributing to this growth, and to the potential of new technologies to foster economic development, job creation, and improvements in well-being through enhanced exporting and activity at home.

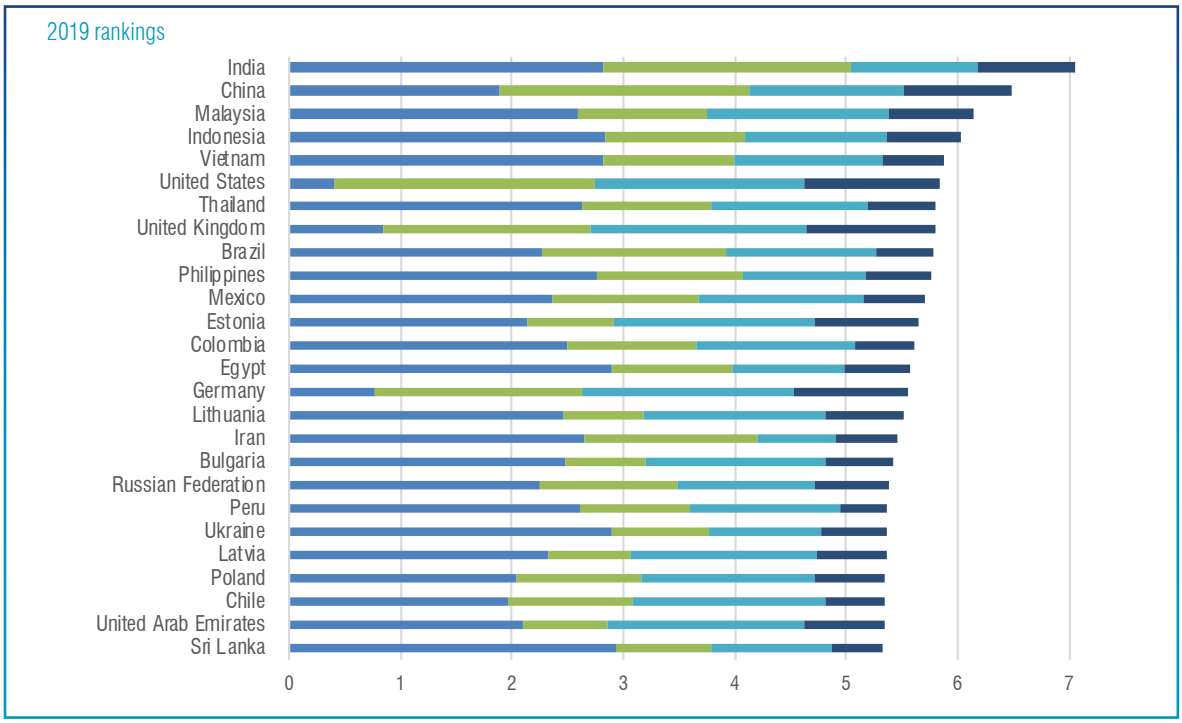
Competitive advantages have driven the growth of the ICT sector and digital economy

The ICT sector is growing in importance to the Iranian economy as a source of value added and employment

The ICT sector accounts for a strong and growing contribution to gross domestic product (GDP); it is the fastest-growing services sector in the country, recording 20% growth in 1989–2016. This growth has been driven by strong demand, which, in the past five years, increased from $6.3 billion to $13.3 billion. The sector also accounts for 10% of total employment, and is an especially important source of employment for young graduates of higher education. It also attracted a significant share (approximately 9%) of non-governmental investment in science, technology and innovation fields in 2014/15.

Despite some areas of weakness, Iran would still rank among the top 20 jurisdictions worldwide in the Global Services Location Index (Annex I), a measure of competitiveness as a location for export of ICT and other knowledge services (Figure 6).

Figure 6: Global Services Location Index: Top 25 countries



Source: ITC

A combination of factors have driven the rapid growth in ICT in Iran

The growth and potential of the ICT sector and digital economy generally have been supported by government policy and planning, investment in ICT infrastructure, and increases in access and use among much of the population (Table 3).

Table 3: Strengths and competitive advantages in the ICT sector and digital economy

Natural assets and exogenous factors	Sector organization	Human and technology factors
• Significant investment in ICT infrastructure • Spreading ICT access and use	• Recognition of sector in planning and policy	• Strong ICT specialist skills

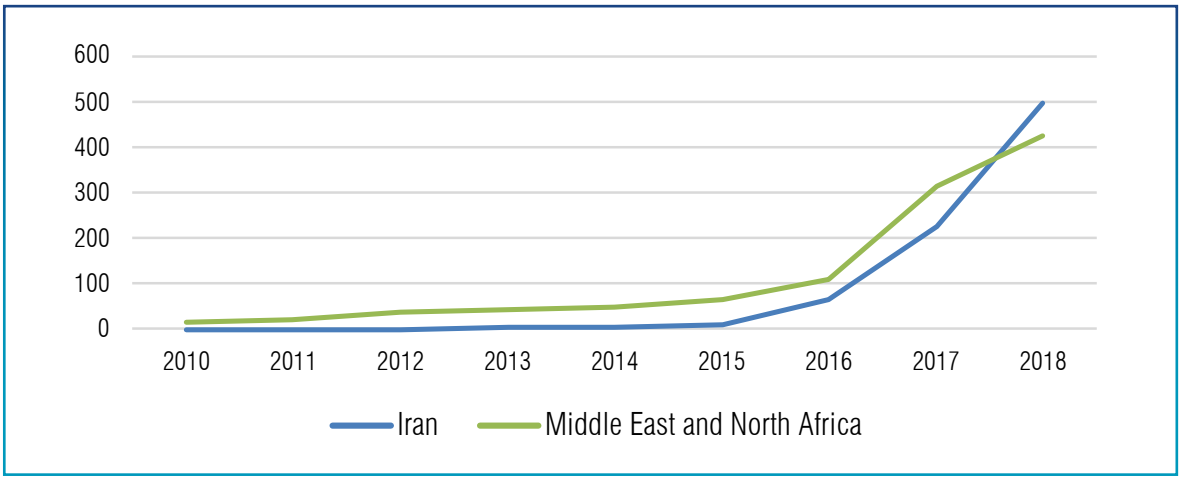
Significant improvements have been made to ICT infrastructure

While further improvements can be made, Iran has made rapid progress in developing ICT infrastructure, which is fundamental to the development of the digital economy.

ICT infrastructure investment totalling $5 billion in recent years has resulted in near nationwide coverage of mobile networks and the national fibre-optic backbone. All cities and approximately two-thirds of villages have either 3G or 4G coverage. The mobile telecom sector is led by Mobile Communications of Iran, MTN Irancell and RighTel, as well as several mobile virtual network operators.

Iran has had submarine cable connectivity since 1992 and is currently served by half a dozen international undersea fibre-optic cable systems, giving access and redundancy to high-speed internet. Cross-border terrestrial connections have been established with the Republic of Azerbaijan, the Islamic Republic of Pakistan and the Republic of Turkey, and international bandwidth to landlocked Islamic Republic of Afghanistan, the Republic Armenia, and Turkmenistan passes through Iran. Internet exchange points (IXPs) have been built in key cities and, at 494.6 secure internet servers per million people, Iran exceeds the regional average of 423.1 (Figure 7).

Figure 7: Number of secure internet servers per million people (2010–18)



Source: World Bank.

Other aspects of soft and hard infrastructure have further supported domestic demand for ICT services, such as e-commerce. Iran was ranked relatively highly in United Nations Conference on Trade and Development's (UNCTAD's) B2C E-commerce Index 2018, ranking 49th out of 151 countries, the eighth-highest ranking for a developing country (Table 4). The index is calculated as the average of four indicators: account ownership at financial institutions, the share of the population using the internet, the Postal Reliability Index, and the number of secure internet servers relative to population. The country performed particularly well in terms of account ownership.

Table 4: Iran's UNCTAD B2C E-commerce Index ranking (2014–18)

	Iran's ranking	Number of economies covered
2014	69th	130
2016	77th	137
2017	47th	144
2018	49th	151

Source: UNCTAD.

Internet access and use are spreading across the country, expanding the domestic ICT market

> ‘There is certainly increased interest among firms who see the potential offered by digital solutions that their peers and competitors are gaining.’

Connecting the providers and consumers of services, and also supporting the development of the skills needed for the sector’s further growth, widespread internet access is fundamental to the ICT sector’s success. Despite its relatively late start, rates of internet use are now higher in Iran than the average for its region, its country income group, and for the world as a whole (Figure 8). In 2017, 64% of the population was using the internet – a considerable increase from the less than 1% share in 2000, and even from the 45.3% share two years earlier, in 2015. Most users are also regular users; in 2017, 63.4% reported using the internet every day and another 7.6% reported using it at least once a week.

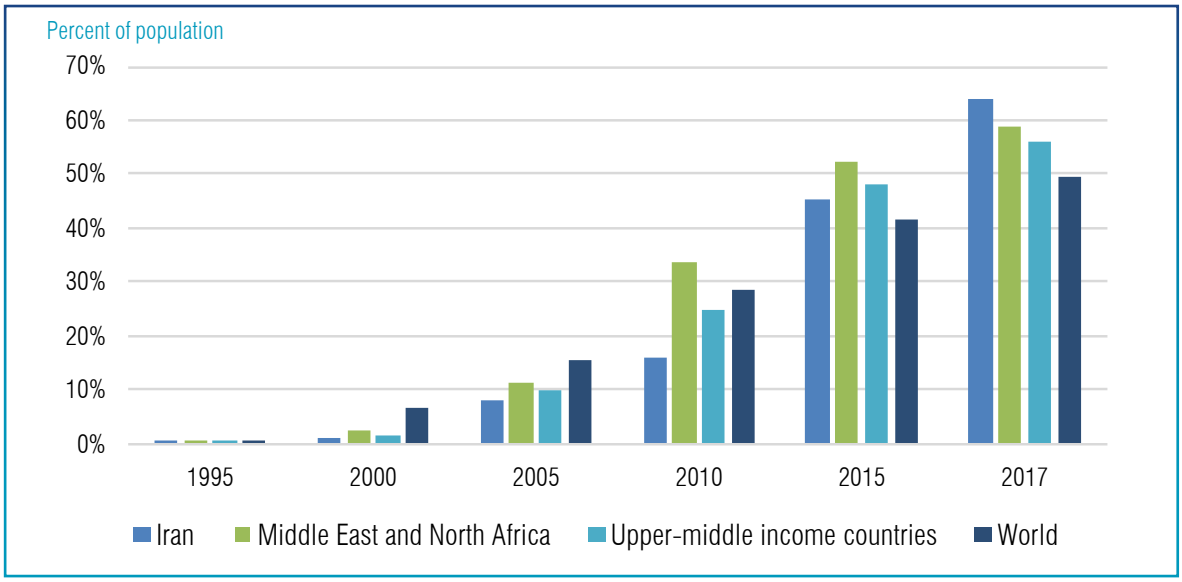
Mobile telephony and internet access is highly popular. In 1999–2018, the number of mobile cellular subscriptions per 100 people increased from less than one to 108.5 and almost all homes had at least one mobile phone.

ICT access is also quite affordable in Iran. Mobile cellular access was 0.4% of gross national income (GNI) per capita in 2017, making it the 29th most affordable jurisdiction in the world, and mobile broadband service (for 500MB) was just 0.5% of GNI per capita, ranked 40th. Fixed broadband internet access cost 1.2% of GNI per capita, which was relatively more expensive in international terms, but still below the Broadband Commission’s affordability threshold of 5%.

Growth in user ICT skills is strengthening domestic demand for digital services. This is demonstrated by the many Iranian consumers who make use of online platforms for shopping. In 2017, 33.6% of internet users in Iran took part in e-commerce transactions. The success of e-commerce despite the challenging external environment faced by the country is a result of its strengths in ICT and other relevant areas. The use of online banking is growing as well. In 2017, 19.1% of internet users in Iran made use of e-banking services.

Demand is also growing in the business sector, as digital transformation grows demand for ICT sector outputs. Firms in primary, manufacturing and services sectors are making use of computers, the internet and other tools to improve the productivity of their core activities such as production and logistics, in addition to connecting with suppliers and consumers through e-commerce.

Figure 8: Internet users (1995–2017)



Source: Asian Productivity Organization.

The potential of the ICT sector and digital economy have been recognized in development planning and policy

In line with recent efforts to facilitate economic diversification towards productive sectors, and in recognition of the overall economic and socioeconomic development potential that Iran's ICT sector and digital economy have to offer, these policy areas have gradually gained prominence within the national development agenda. Notably, ICT has been included as a priority sector in the Sixth National Development Plan, which also included targets on expanding broadband service in rural areas.

In addition, a digital Iran national plan is being developed, shepherded by the Ministry of ICT and involving the Ministry of Agriculture Jihad, Ministry of Energy, National Library of Iran, Ministry of Health and Medical Education, and various municipalities. A multisectoral Digital Economy Commission and a blockchain working group have also been established, among other institutions supporting the sector's development (Table 5).

Table 5: Support institutions active in the entrepreneurship ecosystem

Type of support	Details
Vice Presidency for Science and Technology	Focused on knowledge-based firms, the general goals of the Vice Presidency include: • Promoting wealth creation through increasing innovation and technology capabilities in the country; • Improving the ecosystem of innovation and acceleration of a knowledge-based economy; • Realizing the scientific authority, increasing the share of the research knowledge-based economy from gross domestic product (GDP) and optimally using the resources; • Expanding the support of development of the knowledge-based economy and support of innovation and problem-oriented research.
Information Technology Organization of Iran	The Information Technology Organization of Iran began its services as a subset of the Ministry of ICT in 1998. At the same time, with the change of the name of the Ministry of Post, Telegraph and Telephone into the Ministry of Information and Communications Technology in 2005, some changes occurred in the subordinate companies. On this basis, the identity of the Data Communication Center changed during the summer of 2006 and its name changed to the Data Communication Company of Iran. During the summer of 2007, considering the developments in the targets and missions of the company, its name changed to the Information Technology Organization of Iran in 2008. In 2011, in order to enforce the 44th principle of the constitution, this company separated from the Communication Company of Iran handed over its authorities to the Communication Company of Iran and Telecommunication Infrastructure Company, and its name changed to the Iranian Information Technology Company. In the fall of 2010, on the basis of a joint proposal by the Vice President of Management and Development and Human Resources and the Ministry of Information and Communications Technology, the Iranian IT Company was changed from a government company into a government institution named the Iranian Information Technology Organization of Iran. This was done in order to abstract the policymaking and sovereignty-related activities from the government companies. This change was based on the sovereignty-related duties mentioned in the company's articles of association.
Iran Center for e-Commerce Development (Ministry of Industry, Mine and Trade)	Responsible for the establishment, implementation and development of e-commerce in the country using national and international instruments and standards, with respect to Iranian and Islamic culture, supporting e-commerce activities and promoting the use of information and communications technology in the economy and commerce. Currently, the core mission of the centre, alongside macroeconomic policymaking in the field of e-commerce, focuses on organizing the following five national systems: root electronic certification system, mid-range electronic certification system, government electronic procurement system, business process integration and monitoring systems, and the electronic trust symbol system.
Information Technology & Digital Media Development Center (Ministry of Culture and Islamic Guidance)	Iran's Ministry of Culture and Islamic Guidance, in order to benefit from the opportunities and to deal with the digital media new phase challenges and to organize digital products, decided to establish a new organization, the Information Technology & Digital Media Development Center. This centre is the only digital media trustee that is responsible for observing and developing digital culture in the country. The duties of this centre are to register software and computer games, weblogs, mobile phone content products, to be a culture base for digital media, and to issue different certificates for cultural products and the active institutes.
National Union of Virtual Businesses	Responsible for establishing and consolidating cooperation between members; striving to improve the business environment, and interacting with government agencies, non-governmental public institutions and the private sector; improving quality of service delivered from the members to the customers; and providing appropriate information on the handling of complaints received.

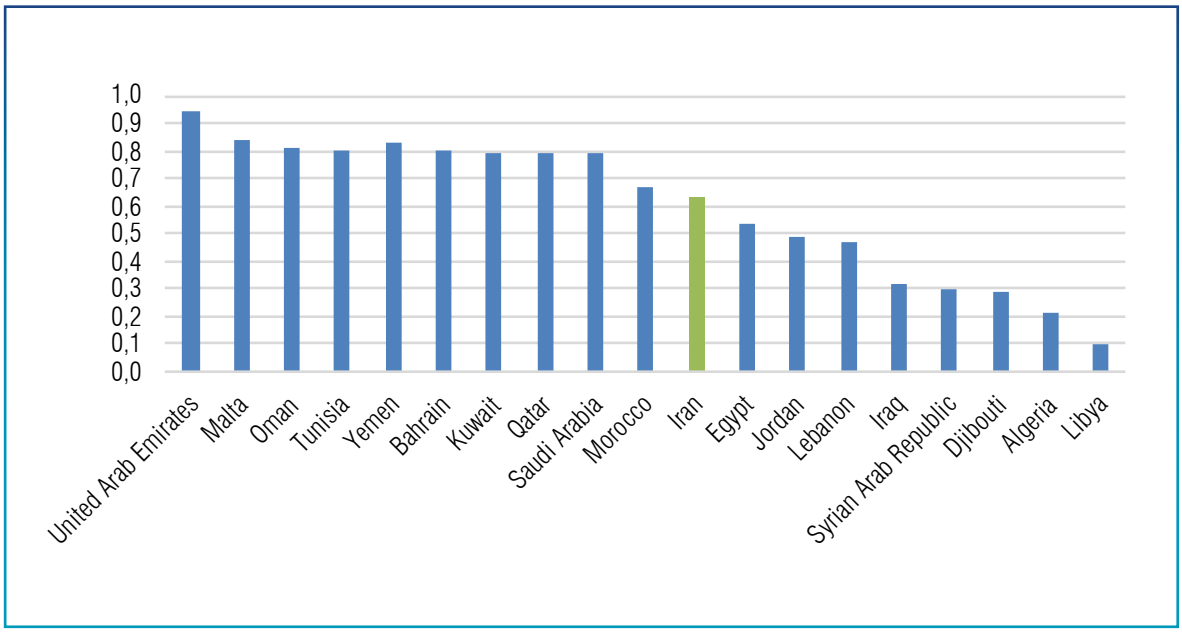
Type of support	Details
Iranian ICT Guild Organization (IIG)	The IIG is an umbrella organization regulating Iran's ICT market of thousands of IT professionals, software developer companies, hardware manufacturers, distributors and retailers. It manages the relationship between the ICT private sector and the government, aims to protect its members and promote their rights through negotiations with public policymakers, encourages members to improve the quality level of their products and services to comply with the latest technology developments, improves the rules and regulations concerning software engineering discipline with full participation of IIG members, and provides the required information on the software industry and target markets.
Innovation and Prosperity Fund	The main purposes of the Innovation and Prosperity Fund are assisting the implementation and development of the knowledge-based economy; completing the idea to market chain; commercialization of innovations, inventions and research results; and making the knowledge applicable through the provision of assistance and financial services to support knowledge-based institutions and companies.

The government has recently announced its intention to establish development parks for the ICT sector, including setting up "digital economy development parks" in Tehran, Mashhad and Arak. While industrial parks, special economic zones and other such specially operated facilities have existed for some time in Iran, a focus on this sector is a new development.

Furthermore, the public sector is a significant customer of the ICT sector, including through its growing e-government initiatives. Currently, there are 201 general services and 734 specific services offered electronically from a wide range of ministries and areas of government. The Government Service Bus (GSB) has served more than 315 million transactions during the past year. There are currently 44 entities providing services to GSB, covering a variety of sectors. On a scale of zero to one, Iran was scored at 0.62 in the United Nation's (UN's) 2018 E-Government Development Index, ranking it 86th globally and around the middle of other Middle East and North Africa countries (Figure 9). Iran was ranked 111th globally in the UN's 2018 E-Participation Index, which measures the availability of online information, online public consultations, and the direct involvement of citizens in decision processes. This represented a significant improvement from the country's 149th ranking in 2016.

Private sector leadership in development planning for the sector is also supporting growth. The Iranian ICT Guild Organization's Bisotun initiative is providing a strategic roadmap for the country's digital transformation, covering digital education and skills, talent management and digital employment, financing, revenue generation and cost cutting, integrated communication with government, market research, international export and national market development.

Figure 9: E–Government Development Index



Source: United Nations, Department of Economic and Social Affairs.

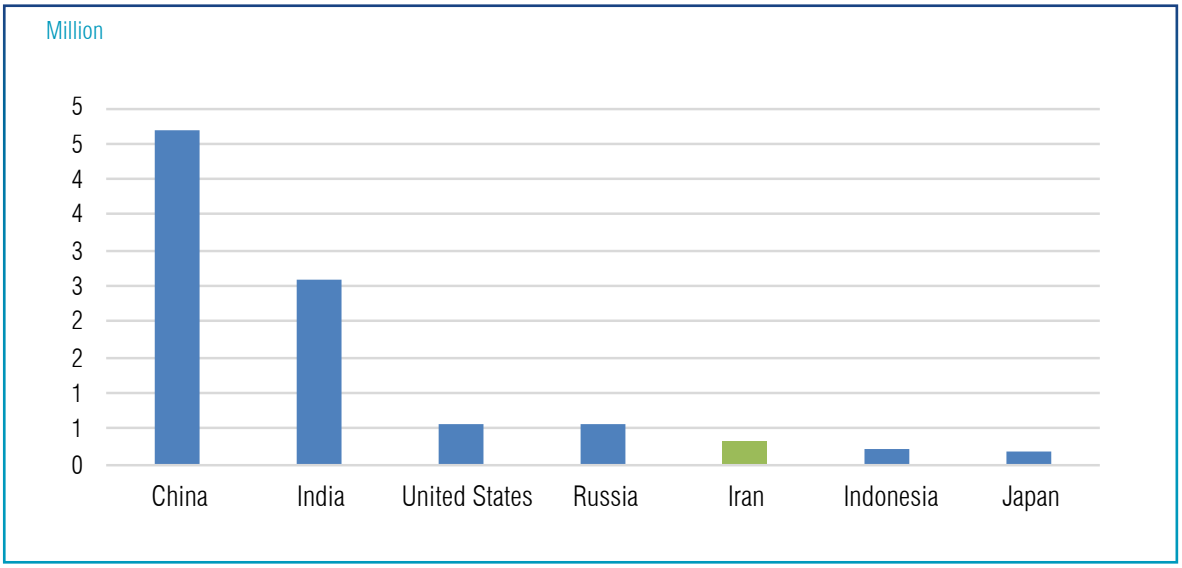
Many Iranians are developing the specialist skills needed for the sector's growth

A key sector in the knowledge-based economy, skills are essential to the development of the ICT sector. Iran's young and well-educated population is a significant support to the sector's growth. The e-commerce sector, for example, is particularly youthful; 79% of all people active in the field of e-commerce are between the ages of 20 and 40.

The strengths of the country's tertiary education sector have supported the development of complementary skills for the ICT sector. Iran had the 5th largest number of recent graduates of science, technology, engineering and mathematics (STEM) programmes in 2016, outpacing many countries with larger populations (Figure 10). Access to online tools and training has further strengthened relevant skills.

At the same time, labour costs are relatively low in Iran, which would provide an advantage to export activities, particularly in more labour-intensive ICT activities.

Figure 10: Recent STEM graduates by country (2016)



Source: World Economic Forum.

ICT exports are small, but growing in importance

ICT services are expanding, though exports remain small

‘Selling in foreign markets has been a challenge, but we have found niches where we have a strong and competitive offer.’

Due to the limited access that global software players have to the Iranian market, local software developers have grown by adapting internationally successful products for the local market. The rapid growth in the ICT sector and the rise of big start-ups like DigiKala or Snapp contributed to the increased awareness across the Iranian economy on the potential of digital technologies.

Based on a study done by the ITC start-up centre, currently, 17.8% of ICT start-ups are active in the e-commerce sector, followed by 12.2% in service marketplaces and 10.8% in education. A growing share of technology start-ups can be observed in the transport, tourism and fintech sectors.

Approximately 400 people work at fintech start-ups in Iran. Most of them are active in paytech (33%), followed by personal finance management (18%) and cryptocurrency (14%). The growth of e-commerce platforms and the trend for cashless payment in Iran are two major reasons for the rise of paytech start-ups. Seven Iranian firms were among the largest 150 merchant acquirers of general purpose credit, debit and prepaid card transactions handled in 2016 (Table 6).

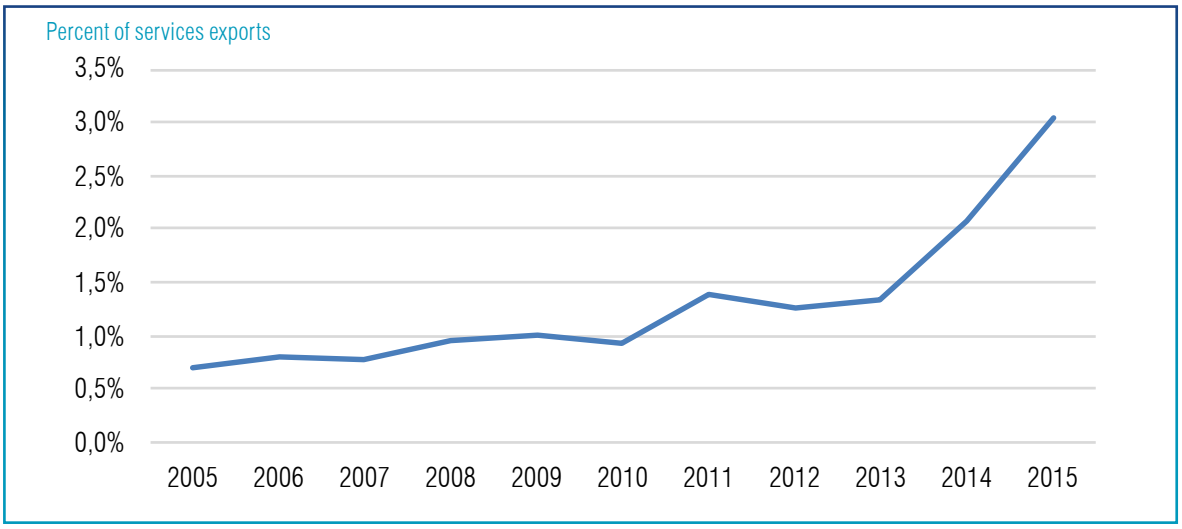
Table 6: Iranian firms among the 150 largest acquirers worldwide (2016)

Rank	Acquirer	Number of transactions (million)
20	Behpardakht Mellat	2 702.4
26	Samen Saman e-Pay	1 907.5
27	Asan Pardakht Persian	1 906.9
35	Parsian E-Commerce Company	1 433.8
63	Pasargad Electronic Payment Company	633.4
65	SadadSADAD Informatics Corporation	584.0
72	Iran Kish Credit Card Co.	497.6

Source: HSN Consultants, Inc.

Computer services exports (the only ICT category for which trade data is available) have been small, but are growing quickly as a share of total services exports. In 2005, these exports accounted for just 0.7% of services exports, though this increased to 3% in 2015, when they were worth $338 million (Figure 11).

Figure 11: Computer services exports (2005–15)



Source: ITC, Trade Map.

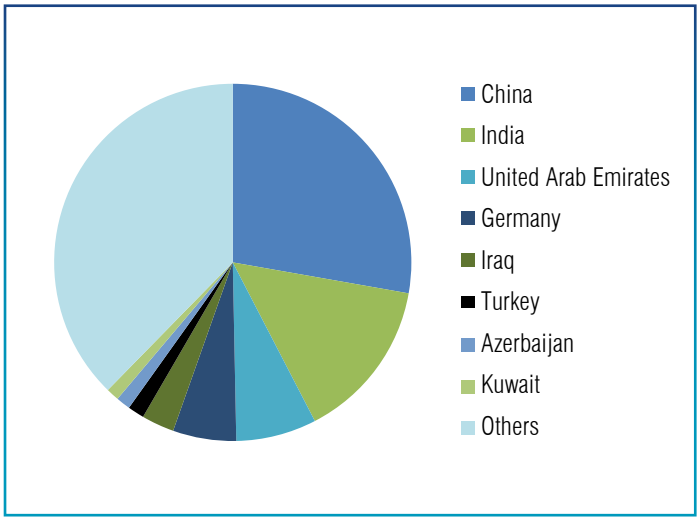
The ICT sector and digital economy have the potential to drive future growth both directly and indirectly

ICT has the potential to make significant contributions to exporting and growth, as well as indirectly affecting development potential

The ICT sector and digital economy have the potential for further growth at home and in supplying export markets. Furthermore, the ICT sector and digital economy possess significant potential to contribute to innovation and productivity growth in other sectors and critical areas such as job creation, education, health, climate change and more. In many ways, ICT is central to the country's transition from a natural resource-dependent economy to a knowledge-based economy.

There is the potential to improve ICT exports with existing capacities and in the current international context by reducing trade frictions and taking advantage of growing demand in key markets. It is expected that China, India and the United Arab Emirates would form the three largest markets for these exports (Figure 12).

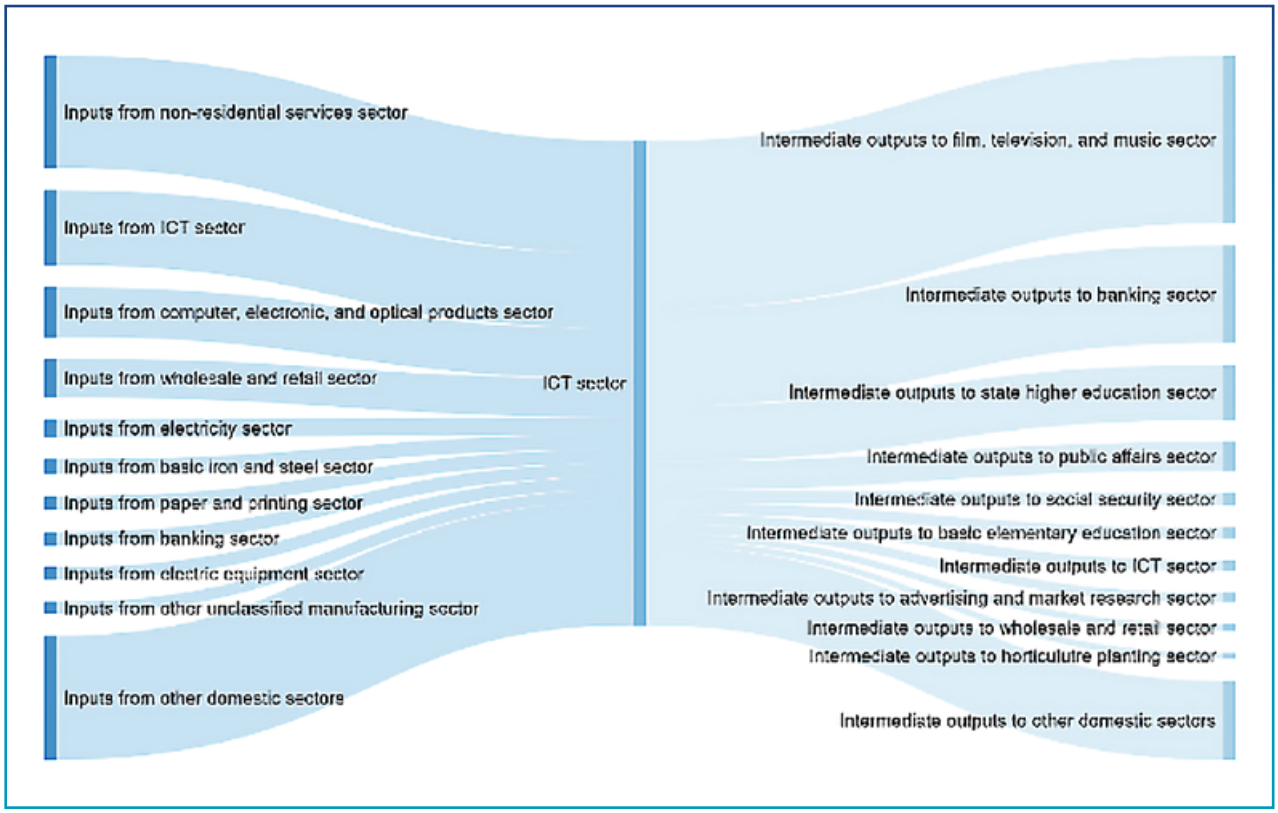
Figure 12: ICT export potential by market



Source: ITC.

The ICT sector is closely connected through direct forward and backward linkages to many other sectors of the economy. As a result, productivity improvements and innovation in the sector have the potential to generate positive spillovers benefitting a broad range of areas of economic activity across the country. The non-residential services sector is the greatest source of inputs to the ICT sector, followed by other ICT services and the manufacture of computer, electronic and optical products (Figure 13). The film, television and music sector, the banking sector and state higher education are the greatest users of ICT sector outputs as intermediate inputs. In total, 84.5% of domestically sourced inputs come from outside of the ICT sector and 97.9% of outputs used as domestic intermediate goods are used outside of the ICT sector.

Figure 13: ICT sector domestic intermediate inputs and outputs (2011)



Note: The ICT sector includes programming, computer consultancy and information services.
The total value of domestically sourced inputs is not equal to the total value of intermediate outputs used domestically, due to imports, exports and outputs used by final consumers, among other discrepancies.
Source: Statistical Center of Iran.

While the direct economic contributions of Iran's ICT sector have been limited, it is an important support for digitalization and the emergence of a knowledge-based economy and has the potential for further growth. Its performance and potential, which will need to be leveraged in this strategy, are supported by a combination of factors related to ICT availability and access, policy and skills.

CURRENT CONSTRAINTS TO INTERNATIONAL COMPETITIVENESS

- Which malleable constraints are most important for the strategy to address, due to their effects in holding back the potential of the Iranian ICT sector?

While recent trends have shown that Iran is moving in the right direction and has the potential to foster further growth of the ICT sector and digital economy, achieving this growth will require addressing several major constraints that increase uncertainty, raise costs, reduce efficiency and prevent full participation in the digital economy. Fundamentally, these issues arise from constraints on the capacities of the sector to compete in the present, connect through accessing and using information and knowledge, and change by adapting to changing conditions and opportunities. Specifically, the Iranian ICT sector and digital economy have been held back by institutional constraints, remaining skill gaps, insufficient support for firm exporting, policy and regulatory challenges, the need for investment and limited support for start-up growth (Table 7). In addition, specific challenges are faced in the software development, fintech and e-commerce subsectors, as well as in digital transformation, e-government and IT consulting.

In the following figures, value chains depicting stylized relationships within software development, fintech and e-commerce in Iran highlight the distinct actors and enabling factors specific to each subsector.

Table 7: Competitiveness constraints

Compete	Connect	Change
• Capacity and organizational challenges in key institutions • Technical and business skill gaps	• Focus on domestic market and limited export assistance	• Maladapted policies and regulations • Additional investment needed to realize potential • Limited support for start-up growth

Figure 14: Iran's software development value chain

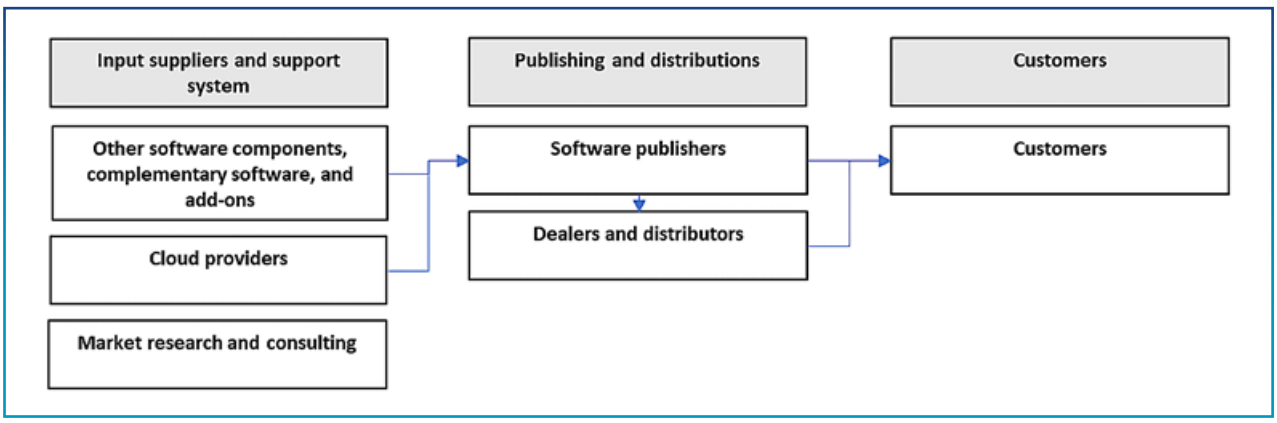


Figure 15: Iran's fintech value chain

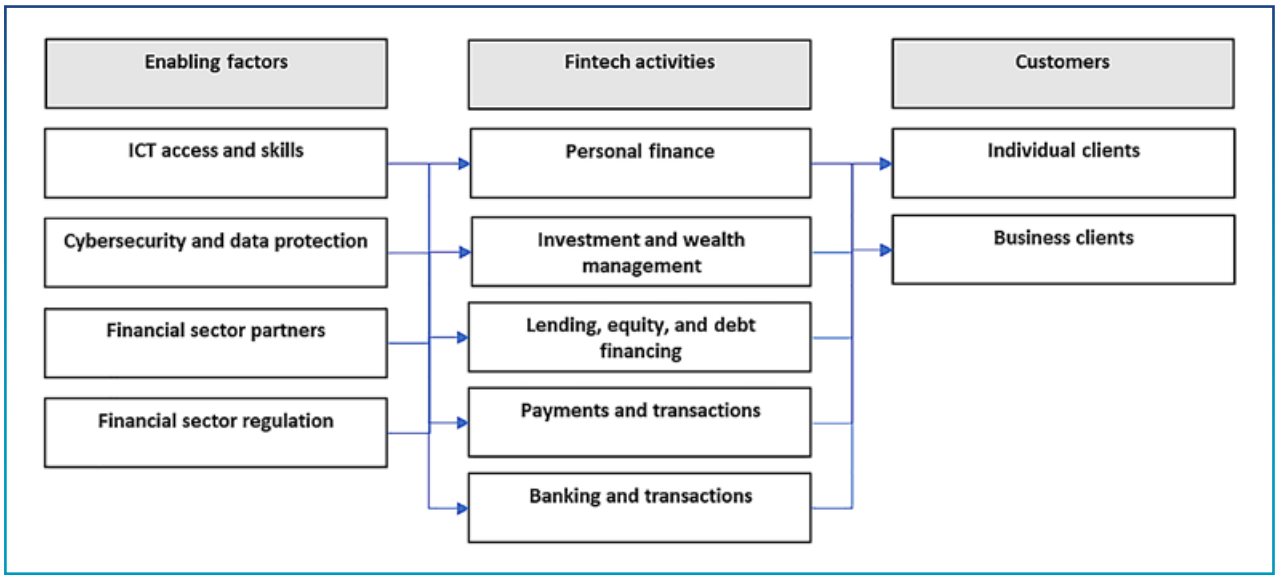
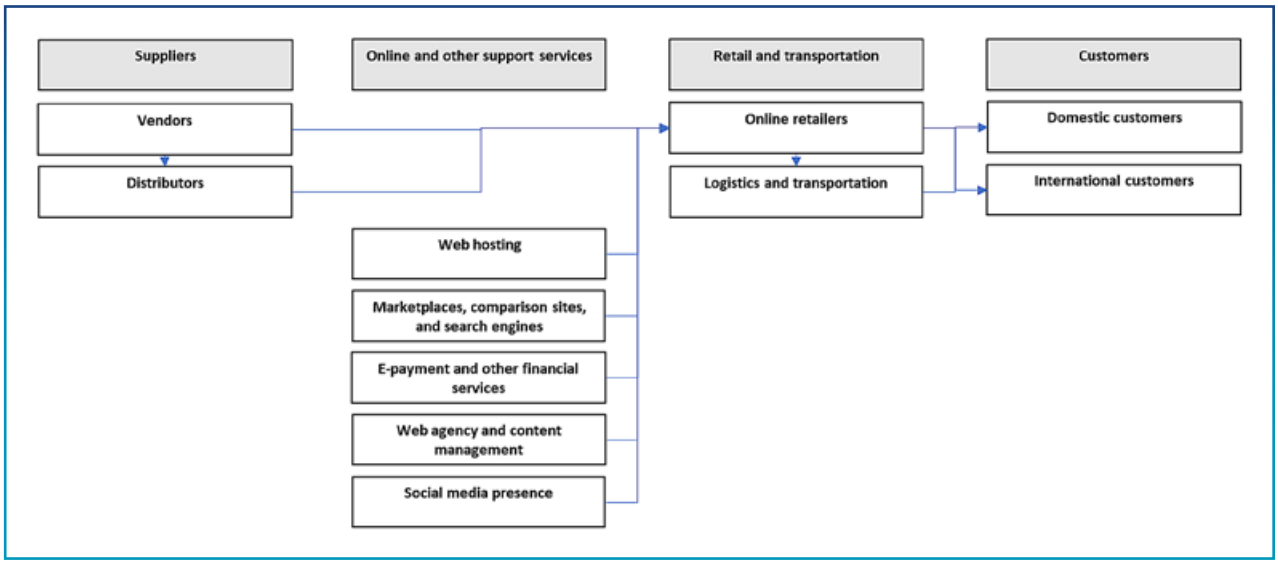


Figure 16: Iran's e-commerce value chain



Institutional challenges impede the effective design and implementation of policy for the sector

Relevant operational objectives:

- 1.1. Consolidate private and public plans and establish a monitoring mechanism

'Effective regulation requires changes to sector governance.'

Despite the increased focus that the government has paid to planning for and facilitating the development of the ICT sector and digital economy, institutional factors still pose challenges. Among these factors is the division of responsibility among organizations.

In addition to the Ministry of ICT, other organizations are developing policies and initiatives running in parallel to those of the ministry. For example, there have been instances of the ministry and the Supreme Council, both of which have policymaking responsibilities, making differing or conflicting decisions on the sector.

This division of responsibilities is not necessarily problematic by itself, and the cross-cutting nature of issues affecting the sector does necessitate a broad approach to its governance. In the case of consumer

protection in digital transactions, the involvement of both the Ministry of Industry, Mine and Trade and the Ministry of ICT is needed. However, there is a lack of coordination and alignment in policymaking, and polices that produce gaps and uncertainties in regulation, incentive programmes and administrative processes.

Skills matching sector requirements need to be strengthened

Relevant operational objectives:

- 2.1. Retain Iranian ICT specialists
- 2.2. Increase number of graduates in ICT specialties

Despite Iran's strong education system, finding and retaining workers and managers with the skills needed by the sector remains a challenge. Digital skills are essential for the producers, users and consumers of content, and are thus fundamental to the development of the ICT sector and digital economy.

Further developing technical skills will be essential in driving further innovation in the sector. Relatively low pay in the sector contributes to brain drain through the loss of skilled labour to higher-paying activities at home and abroad. These losses also discourage firms from investing in staff training.

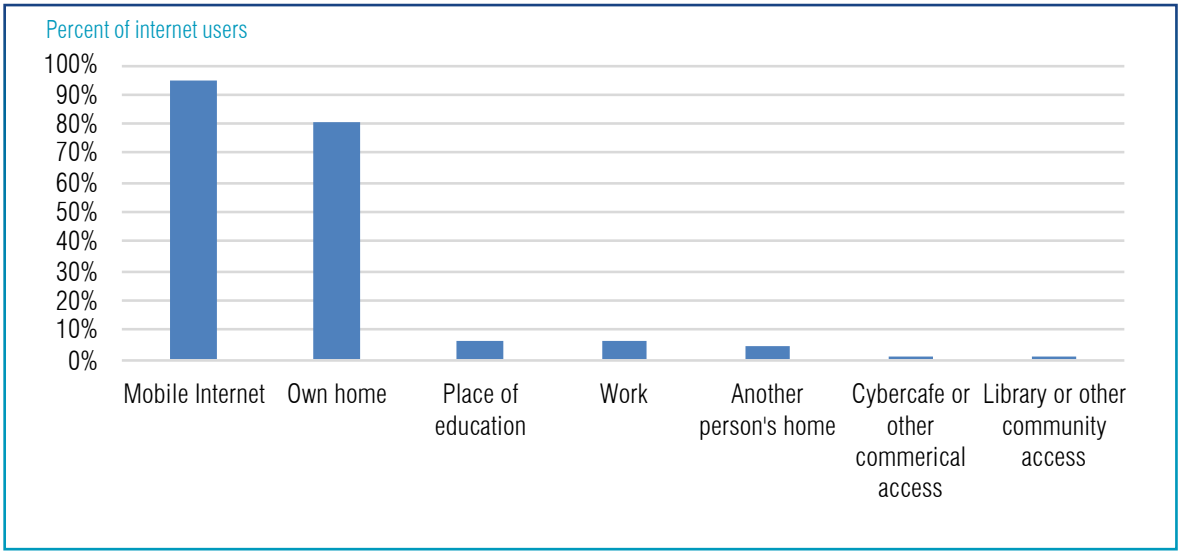
Gaps in skills and access also hinder the sector from being a driver of inclusive growth. According to a recent survey on digital skills, even some straightforward tasks, such as using basic arithmetic formulas in a spreadsheet and connecting and installing new devices, are possessed by relatively few people. Skills are lacking in rural areas in particular. The highest levels of education are concentrated in cities and, even at lower levels, access to education can be limited in other parts of the country.

Despite the considerable growth of internet use in Iran, its potential as a tool of work has not yet been fully realized. Only 5.9% of individuals using the internet in 2017 did so at work (Figure 17). Fundamentally, skill and knowledge gaps, infrastructure issues and financing account for many of the constraints to digital transformation among Iranian firms. Many small firms in particular still face barriers in adopting ICT, including poor infrastructure, lack of workers with digital skills and insufficient incentives for training, lack of comfort with and trust in ICT, software challenges, complicated administrative processes and weak data backup systems.

These inequalities in access and use are reflected in the characteristics of ICT sector firms. Like the other start-up industries in Iran, the majority of fintech start-ups are based in Tehran (81%) and they are dominated by male founders (85%), for example.

Gaps are also present by gender; according to a recent study, only 9% of e-commerce employees in management positions are female. According to an article published on the website of the Ministry of ICT, there are attempts to open up the ICT sector to women and achieve gender justice within the framework of Iran's laws and policies.

Figure 17: Location of internet use (2017)



Source: Ministry of ICT; Information Technology Organization of Iran.

ICT firms are focused on the domestic market

Relevant operational objectives:

- 1.4. Facilitate and incentivize export of Iranian software
- 2.3. Build export skills and knowledge within ICT firms
- 3.1. Spread certification of Iranian ICT products
- 3.3. Spread the use of EMCs
- 3.4. Establish foreign networks for ICT export-ready firms
- 3.5. Raise awareness on Iranian ICT sector in key markets
- 3.6. Support firms to access regional and international markets

Iran's ICT sector is predominantly focused on serving the domestic market. Firms looking to serve international markets face a number of challenges in doing so, including administrative and regulatory requirements, as well as the cultural and other differences in foreign markets.

An insulated domestic market limits opportunities for expanded scale, exposure to competition, and international financing. Sanctions have further complicated this situation, as companies are not always able to work with the vendors best suited to their needs, which has affected the work of all players in the sector, including those focused on payment, analytics, content and cloud platforms.

From India to Brazil to the Arab Republic of Egypt, building capabilities serving the local market has been a key stepping stone that enables firms to develop credentials and skills that can later be leveraged to drive their exports. Other countries have used distinctive capabilities developed in the local market as their springboard for exports, such as software solutions for financial institutions in Brazil or e-government expertise in the Republic of Estonia. In Iran's case, given the government's dominant role in the economy, the Iranian Government has a big role to play in ensuring that local ICT firms get opportunities to build up their expertise within the local market. The Government of Iran can support the development of the local ICT market in a number of ways, including e-government contracts, fostering ICT use in other sectors, and within-government ICT use.

Constraints on cross-border payments pose a serious limitation on the scope of e-commerce activities, though it also affects fintech and other ICT subsectors. Addressing this is foremost a political challenge; from a technical standpoint, there is ample expertise in the country to build the connectivity and regulatory framework required once there is space to do so. For future e-commerce growth, cross-border trade will certainly be an important area to develop. This will require addressing key issues, including support programmes, the use of the single window and the availability of cross-border logistics services.

The support ecosystem for start-ups in the sector is growing in scale, despite concerns about the quality of services offered, and there is need for additional support to firms looking to export. Information is needed on the administrative and technical aspects of selling in these markets, and on market conditions and expectations, including certifications for service providers. Promotion activities may also be needed to raise the profile of the Iranian sector.

Once stakeholders agree which geographic markets and product–industry niches Iran's ICT firms can claim to have the most distinctive capabilities to serve, there are a number of market research and marketing activities that it will make sense to undertake jointly (Box 1).

At the same time, the development of the local market can be an important way of growing demand, as well as providing a stepping stone to export success. In many countries, building capabilities serving the local market has enabled firms to develop credentials and skills that can later be leveraged to drive their exports. In many cases, firms have used distinctive capabilities developed in the local market as their springboard for exports; for example, high-speed software solutions for financial institutions in Brazil or e-government expertise in Estonia. In Iran's case, the government will likely have a big role to play in ensuring that local ICT firms get opportunities to build up their expertise within the local market. This may be through:

- E-government contracts (including identifying and outsourcing opportunities for e-delivery of government services across ministries and sectors);
- Encouraging other major local industries (such as oil and gas, agriculture, or tourism) to maximize ICT usage and outsourcing;
- Focusing on quality requirements in government procurement contracts to encourage the development of new capabilities (including, for example, mobile payment solutions, automated ID technologies and AI interfaces).

Box 1: Refining market research, targeting and outreach in the ICT sector

An industry working group – possibly under the umbrella of the Iranian ICT Guild Organization or with membership overlapping with the group responsible for managing the implementation of this strategy – could work to further clarify potential opportunities for the Iranian ICT sector, in particular through secondary outsourcing.

The group would be responsible for leading research on the top software outsourcing contracts awarded in recent years and prioritizing these based on their fit with the capabilities of Iranian firms and the primary contractor's likely openness to Iranian subcontracting (e.g. by identifying those where the primary contractor is a smaller firm and likely overstretched and with weaker USA connections). Customized pitches could then be prepared for priority opportunities, highlighting which sub-components could be subcontracted and why, and the relevant strengths of Iranian firms. Key decision makers at the primary contractor would be reached out to directly, including through leveraging Iranian ICT diaspora connections with the contractor or ultimate client.

More generally, targeted market research and marketing activities building on the identified strengths of and market opportunities for the Iranian sector can be pursued. This would require research to confirm and prioritize specific market opportunities, high-potential market–service combinations, and promising buyers. Joint marketing for each target market and type of service could then be developed, making the business case for Iranian firms with specific case studies and examples proving Iran's capabilities. Relevant marketing channels may include local language websites, trade missions, liaison offices and leveraging existing channels such as specialist fairs and events or publishing articles in specialist publications. Collective tracking of progress could also be used.

Policy and regulation reforms adapted to the sector's needs are needed

Relevant operational objectives:

- 1.2. Fill the current regulatory gaps and build understanding about ICT regulation
- 1.3. Increase public–private collaboration on ICT projects

> ‘It's a unique sector in many ways. The regulatory environment needs to reflect that.’

Policy and regulatory issues affecting the sector negatively are primarily related to the lack of a supportive framework adapted to and reflecting the ICT sector's needs. These are unnecessary impediments to hold back exports, entrepreneurship and innovation. These challenges are further complicated by the significant state involvement in Iran's hi-tech sector generally, and hardware manufacturing in particular.

Protection of intellectual property is insufficient to support the sector's growth. Iran was ranked 136th out of 141 economies in terms of intellectual property protection in the World Economic Forum's Global Competitiveness Report 2019, continuing a recent declining trend (Figure 18). Domestic innovation depends on strengthened protections at home and in export markets. There are also a significant number of pirated and unlicensed versions of internationally produced software being used in Iran, which could complicate Iranian firms' work with foreign clients or partners in future. Improving the situation would require efforts on the enterprise side to raise awareness along with policy reforms, including greater engagement in international fora such as the World Intellectual Property Organization (WIPO) and the International Chamber of Commerce, which is currently involved in Iran.

The legal framework underpinning e-commerce is severely underdeveloped in Iran. There are gaps in the governance of electronic transactions (including online contract agreement and formation), digital signatures, data protection and consumer protection.

Innovation in fintech and in other ICT subsectors has been held back by the need for regulatory sandboxes in Iran, which would allow for experimentation in a controlled environment, balancing the interests of policy and innovation. The lack of sandboxes discourages and delays the commercialization of new ideas and is burdensome from a regulatory standpoint for companies. In addition, the core systems of many banks are not yet flexible enough to offer the kinds of information needed for data authentication and other essential activities, despite improvements in financial institutions' APIs.application programming interfaces (APIs). As fintech and the ICT sector more generally adopt new

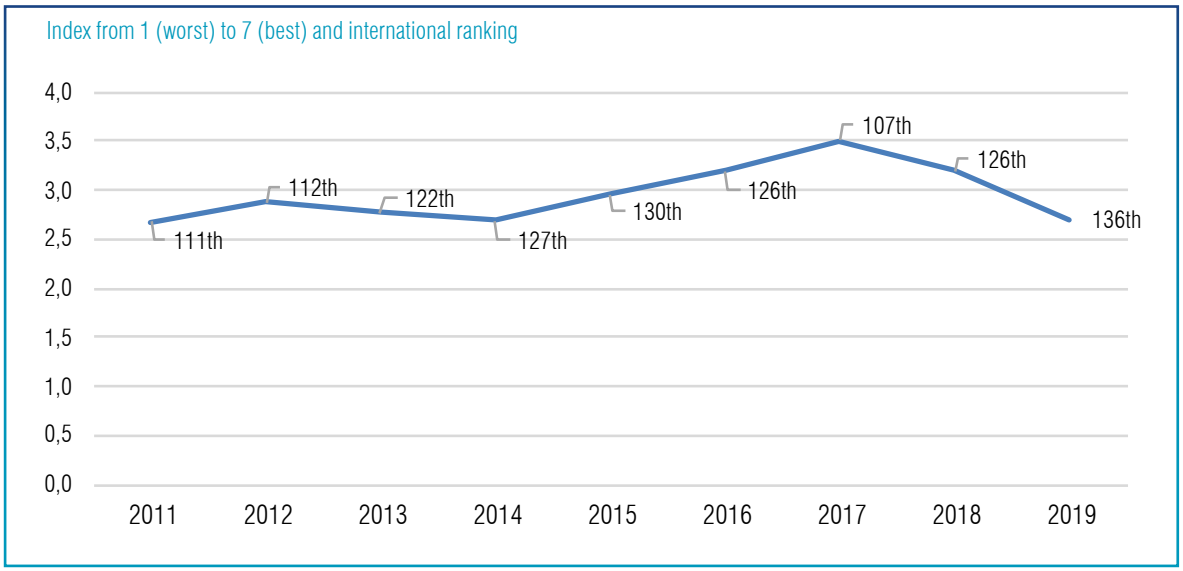
technologies such as blockchain and merge old and new business models, the regulatory framework will need to be appropriately adapted as well to allow for growth while protecting consumers and pursuing other policy objectives.

Regulatory ambiguities raise costs for firms. Different sets of regulatory and approval processes for software developers in Iran can be complex and even contradictory, creating confusion and requiring significant investments of time and money by firms. Tax policy has also been a problematic issue due to the uncertainties it creates for firms; stakeholders have mentioned that it is difficult to find the appropriate values for value-added tax (VAT) and withholding tax obligations without a published guidance or contact point of inquiries.

Firms in the sector have complained that there is a lack of qualified reviewers of tenders from the ICT sector in government procurement. In addition, the same vendor selection mechanism used for other forms of government procurement is used, despite the unique nature of the products and services offered by ICT firms. A separate mechanism for software services may, therefore, be needed.

Iran's e-government initiatives have tended to prioritize the collection and use of data on users without offering improvements in service for citizens. For example, the National Smart Card, which is used for personal identification, allows for tracking and retention of data on individuals, but has been criticized for not producing noticeable benefits in access to government services. As a result, the relevance of e-government as a potential catalyst for further growth in domestic demand for ICT goods and services is limited.

Figure 18: Strength of intellectual property protection (2011–19)



Source: World Economic Forum.

New approaches to attracting investment and accessing finance are needed to support the sector's development

Relevant operational objectives:

- 3.2. Focus investment in ICT firms with high potential for export

Additional investment is needed in the sector to drive its growth, improve the range and quality of products and services offered, and reach export markets. This need was recognized in the Sixth National Development Plan, during the period of which $18.5 billion in investment for the sector was planned. However, the sector's visibility and attractiveness to investment remain limited, particularly regarding international investors.

On top of this, access to finance is a common challenge for Iranian firms, particularly for SMEs, and ICT firms face additional constraints due to banking rules and practices. Given the barriers to start-up financing

from outside the country, venture capital and alternative sources of financing are limited. Even where venture capital is active, it is managed by traditional operators who have limited knowledge or expertise in the area of technology based start-ups.

The collateral policy of Iranian banks is geared predominantly towards fixed asset mortgages (in the form of land or buildings). Although a law prohibits banks from securing their loans with non-industrial assets, the banks still insist on this form of security. The fact that intangible assets are not accepted as collateral is particularly challenging for ICT firms, which are likely to have larger amounts of knowledge-based capital.

While alternative forms of financing have been developed, they have not yet made their full intended impacts. The National Innovation Fund invests in knowledge-based companies and start-ups that contribute to economic diversification and the growth of the digital economy. The fund will disburse loans at approximately 4% interest rate annually for firms in knowledge-based activities, and at a higher interest rate for companies in other categories. However, the fund's criteria for disbursing funds remains unclear and fears have been expressed that it is or could be used to channel funds to well-connected firms.

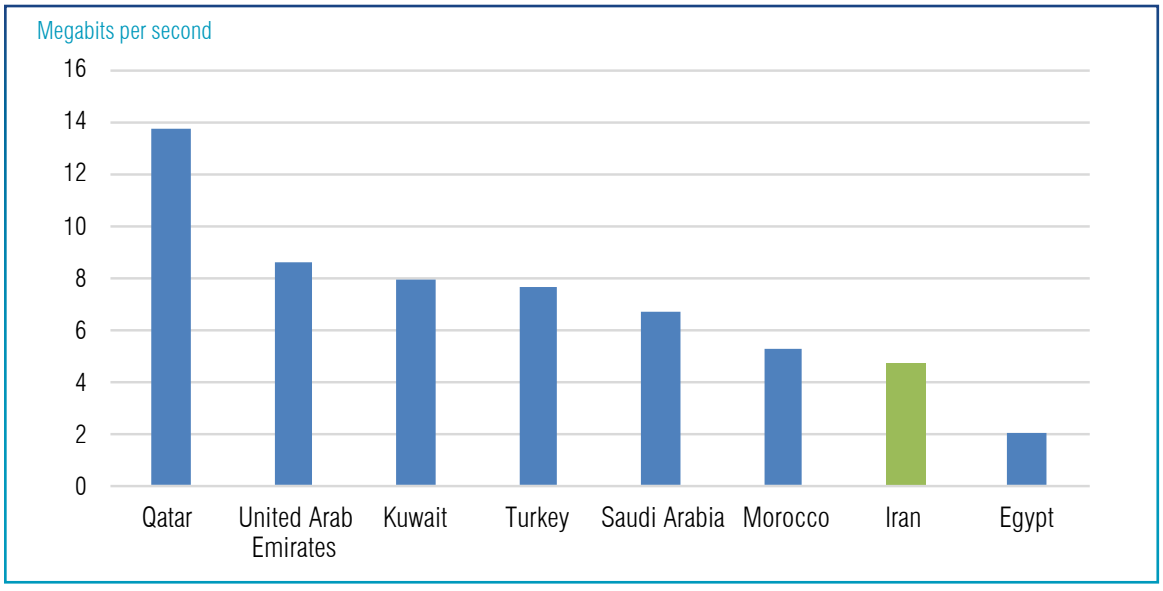
The scope of the Innovation and Prosperity Fund, which is affiliated with the presidential office, has been expanded to include ICT platforms, though these are being assessed based on their total number of users, which may not be the most appropriate measure of value or potential. Sector stakeholders have expressed concerns about both the Innovation and Prosperity Fund and the National Innovation Fund, such as in the use of their funds by applicants that should be ineligible.

In addition to the need for investment in ICT firms, further development of infrastructure is needed. The many Iranians with lack coverage and access to these technologies represent limitations to the critical domestic market and prevents their potential participation in the sector. This is complicated, as investment by mobile network operators and others is constrained at present as a result of sanctions. Indirectly, increased uncertainty and the currency depreciation, which has raised import costs, have led to delays in investment.

ICT access is not distributed evenly across the country. The rural–urban digital divide is particularly stark. While 70% of urban residents were internet users in 2017, only 46.2% of rural residents were online. Similarly, rural residents are much less likely than urban residents to own either laptop or desktop computers, though the two groups are closer in tablet ownership (31.4% of rural households and 35.2% of urban households). The divide in internet use between men and women is present, but not too large; 51.6% of internet users are men, while 45.1% are women.

In addition, Iran's internet connections are relatively slow. On average, Iran's 8.8 million IPv4 addresses connected at 4.7 megabits per second in 2017, slower than in many other Middle East and North Africa (MENA) countries (Figure 19).

Figure 19: IPv4 address average connection speed in elected countries (2017)



Source: Akamai Technologies.

Support for start-ups has often not been sufficient to overcome the challenges to growth

Relevant operational objectives:

- 2.4. Improve the quality of the start-up and SME ecosystem and support
- 2.5. Support innovation and uniqueness of Iranian software solutions

Despite the rapid growth of the ICT sector and digital economy, Iranian start-ups often face challenges in their early establishment and growth for which there may not be sufficient support. Established firms have been slow to adapt to new technologies and the opportunities they afford in production, managing relationships, promotion and delivery. However, new and small firms often lack the experience needed to live up to their potential. This is compounded by insufficiently developed business and management skills in many firms.

For example, e-commerce offers new opportunities to smaller firms, though SMEs can face additional challenges in participating in e-commerce activities. Both internal (e.g. insufficient information and skills, incompatibility with firm structures and processes, high initial costs and resistance to change) and external factors (e.g. customers' resistance, lack of supporting legal framework, lack of needed skills, and international sanctions and barriers to payment) hinder SME participation in e-commerce activities. Separately from the effects of sanctions, electronic payment is complicated by there being no direct debit options available, preventing companies from operating subscription-based payment models.

Support for new firms has often not been sufficient to overcome the challenges of this environment. Iran's start-up accelerators have had limited success, and the country's top-performing start-ups have originated from outside of the existing accelerators. Stakeholders in the sector have expressed concern over the large number of entities positioning themselves as accelerators without the expertise or background to be able to act as mentors to advanced-stage start-ups. As a result of this, the quality of services offered is often poor, resulting in reduced trust in accelerators generally. Consolidation and improved regulation on the establishment and operation of accelerators in the country may, therefore, be needed.

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Iran's ICT sector faces constraints in its ability to compete, connect and change to drive improved exporting and success in the domestic market. Key constraints related to institutional capacities, skills, domestic orientation, the policy environment, investment needs and support for firm growth will need to be addressed by the strategy in order to realize the sector's potential.

THE WAY FORWARD

- Where should the strategy direct the development of the ICT sector?
- What actions are needed to achieve the strategy vision and what does this imply for trade with target markets?
- How can the implementation of the strategy best be supported?

The strengths of the ICT sector and digital economy will need to be leveraged in overcoming its challenges to support continued growth and development domestically and in export markets. Specifically, the sector can build on the sector organization and human and technology factors outlined above in addressing constraints related to policy and institutions, inequalities in access, support programmes, access to finance, digital skills and other topics. Actions organized under the strategy's three strategic objectives will work towards solving these challenges.

Vision and strategic objectives

The vision summarizes the sector strategy's ultimate goals and purpose. The vision for the ICT sector and digital economy of "Building the knowledge-based economy and connecting Iran to strategic markets" highlights the central role of ICT in building the knowledge-based economy and its potential to contribute to enhanced competitiveness and export orientation.

This vision is to be realized through actions under three strategic objectives that leverage strengths and address the key constraints identified as barriers to realizing this vision through institutional and policy reform, improvements to digital skills and access, and support for SMEs and start-ups with international potential.

Strategic Objective 1: Establish an enabling ecosystem for ICT SMEs and start-ups to thrive

Firms in Iran's ICT sector face many challenges in the business environment similar to those in other areas of the economy, but are also subject to constraints unique to their position in an emerging and knowledge-based sector. The strategy will work to improve their situation through actions on the policy environment, collaboration with the public sector, and exporting. The consolidation and monitoring of private and public plans for the sector will provide improved clarity for investment and policy coordination. Addressing regulatory gaps will reduce uncertainty and increase efficiency. Increasing public–private collaboration will bolster productivity and domestic demand. Actions to facilitate and incentivize software exports will help to establish a sector more aware of international opportunities.

Strategic Objective 2: Further develop skilled human capital and spur innovation

Skills are at the foundation of a successful ICT sector, and the strategy will address the need to grow and retain the pool of talent, strengthen capacities for building thriving businesses, and support the development of the skills needed to drive innovation in the sector. Actions to be taken under this objective will focus on retraining and upgrading the technical skills of current

workers and increasing the number of graduates in related fields. Firms' business skills will be improved as well, particularly with regard to export capacities. Improvements to the quality of support for start-ups and SMEs will be essential to this process. Finally, the strategy will support and encourage innovation in Iranian software development.

Strategic Objective 3: Consolidate the competitiveness of ICT firms to enhance export readiness

Moving into international markets will require ICT firms to become more competitive through enhancements to the quality and value of the services they offer. Assisting firms to expand certification by international standards will open new markets to exporting and allow for the development of higher-value products. In support of the sector's growth and innovation, action will be taken on attracting investment, particularly in high-potential activities. Support for the growth and more intensive use of export management companies with services tailored to the sector's needs will help firms to overcome obstacles to trade. Actions will be taken under the strategy to build networks of firms engaged or capable of engaging in exporting. At the same time, promotion and awareness-raising activities in target markets will work to improve demand and lower exporting costs for Iranian firms. Support for firms in accessing these markets will also be prioritized.

The figures below show future value chains depicting stylized relationships within software development, fintech and e-commerce in Iran and highlight how the strategy will address particular aspects of these subsectors.

Figure 20: Iran's software development future value chain

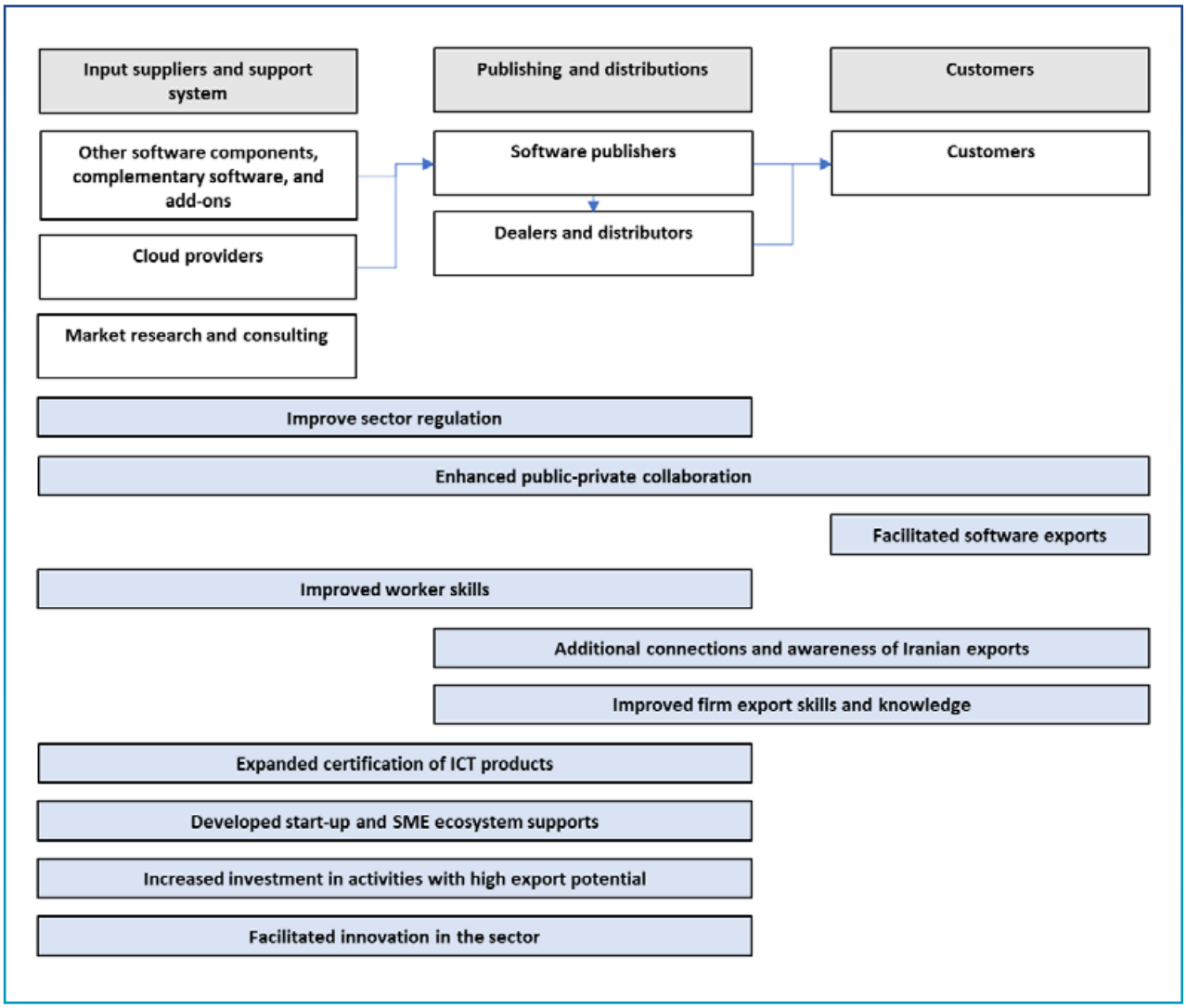

Figure 21: Iran's fintech future value chain

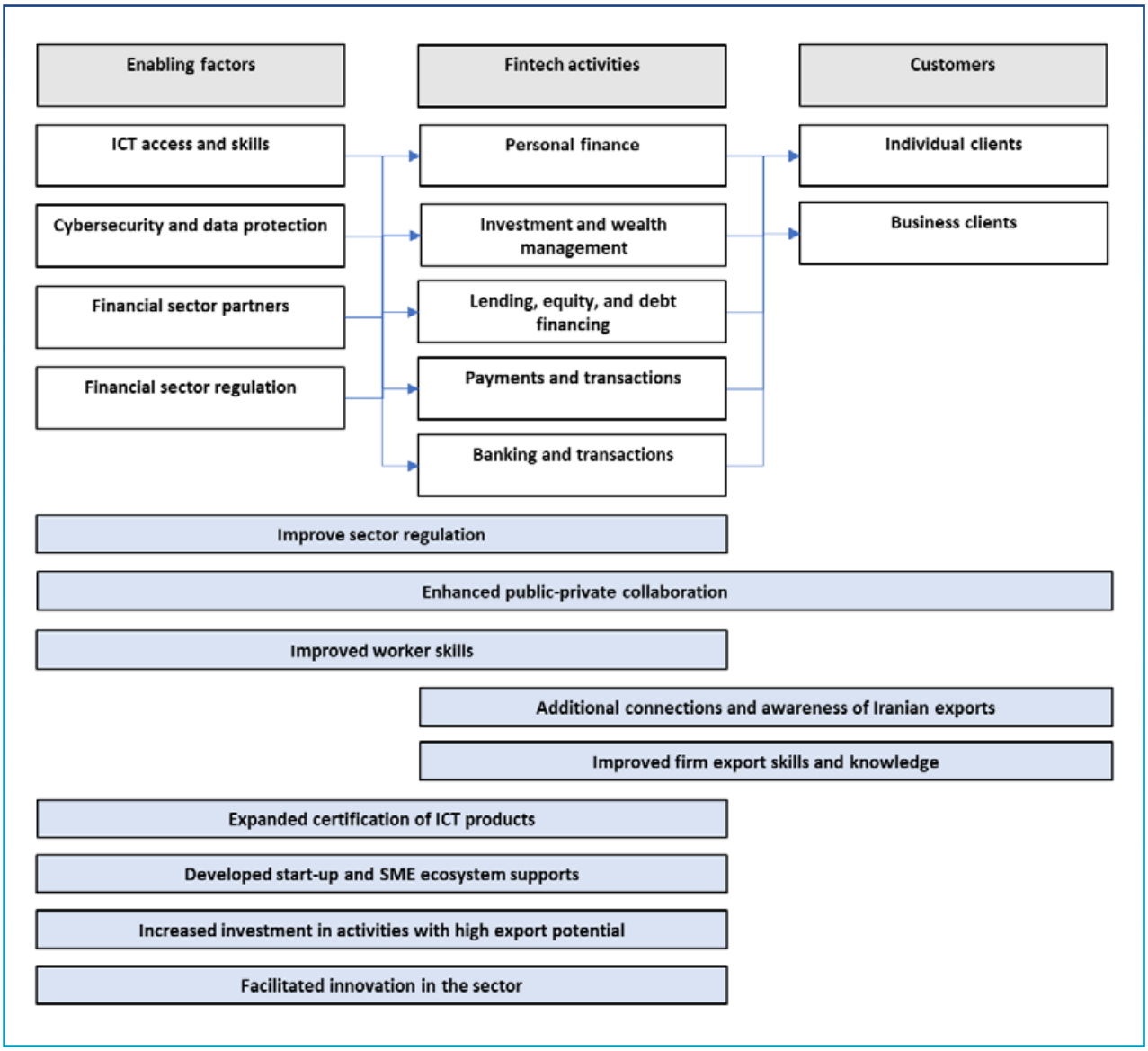

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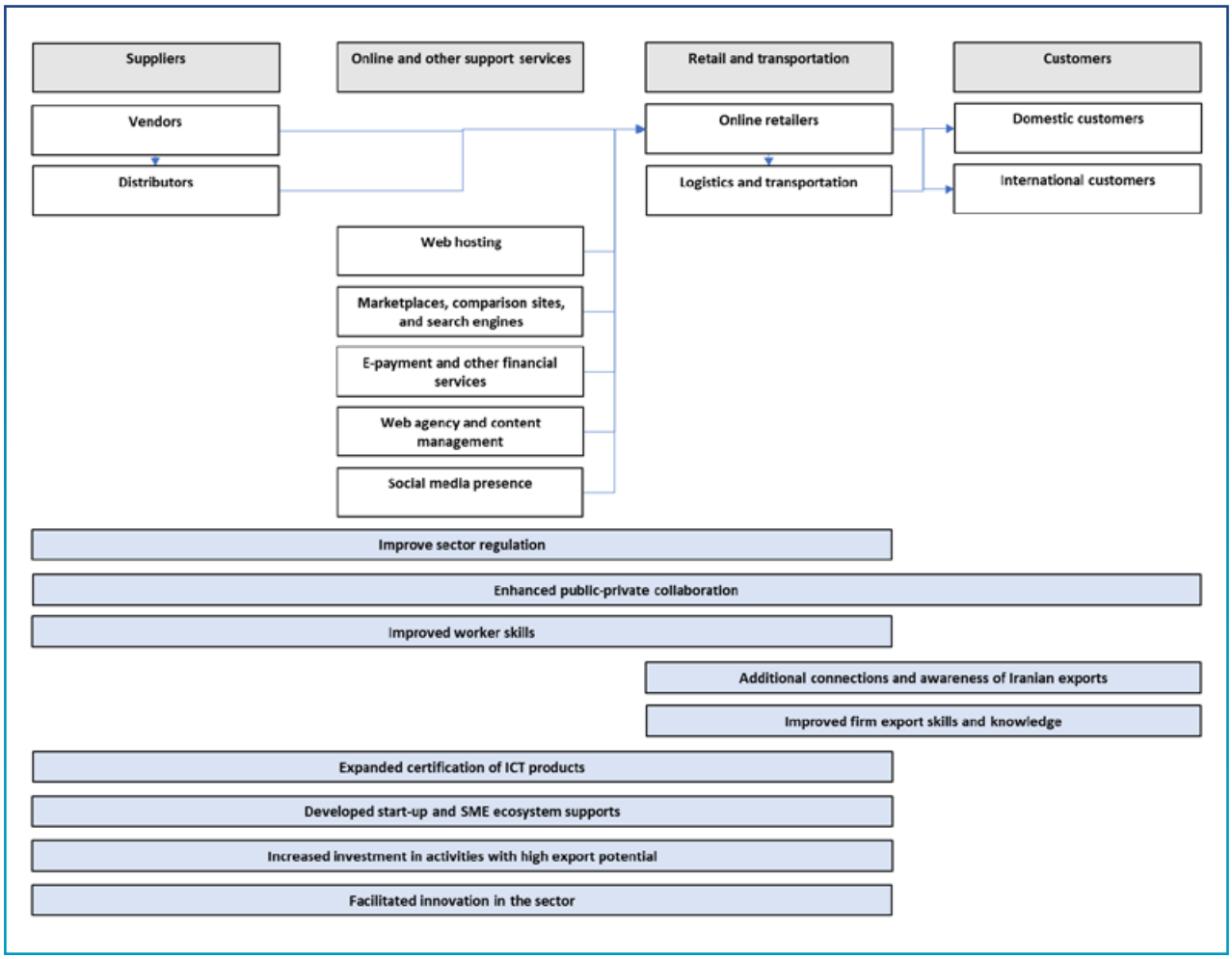
Figure 22: Iran's e-commerce future value chain



Target markets

Within the context of these general guidelines for the ICT export strategy, stakeholders need to take into account specific market conditions within key target markets (Annex II). Key factors in deciding which markets to prioritize include current and future demand, the exposure of these markets and customers to risks related to US sanctions, opportunities created through the use of non-traditional fintech solutions, and the potential for secondary outsourcing work. While there is often a trade-off between those markets that offer the greatest scale and growth potential and those that are most likely to be open to exports from Iran, high-potential target markets for the sector include China, India, the United Arab Emirates, Germany and the Republic of Iraq.

CHINA: A LARGE AND RAPIDLY EVOLVING MARKET PRESENTING A NUMBER OF OPPORTUNITIES

The size of China's economy and the extent of its digitalization make it an attractive export market for ICT services. Further growth in future can be expected to further increase interest in this market. However, Iranian firms looking to succeed there face challenges in succeeding in its market and in competing with established domestic firms and exporters. Taking time to develop export opportunities is nevertheless likely to pay off.

China is rapidly digitalizing. While little more than half of the population (54.3%) used the internet in 2017, growth in use has been impressive, from 22.4 million users in 2000 to 752.8 million in 2017. It is expected that 1.2 billion people, or 88.6% of the population, will be online in 2030. Although many Chinese have so far been

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left out of the digital economy, many are intensive users of new technologies. Digital payment – particularly through Alipay and WeChat Pay – is commonly used.

Mobile internet is extremely popular, including for e-commerce. There were 115 mobile cellular subscriptions per 100 people in China in 2018. The reduction of data fees by the Ministry of Industry and Information Technology and end of domestic roaming charges by major carriers in 2018, as well as the extension of 5G service, is expected to further grow mobile internet use in the country.

China is home to an extremely large and growing e-commerce market, fuelled in part by retailers' seamless online and offline strategies. In 2018, digital commerce was valued at ¥10.2 trillion, with the retail total valued at ¥5.4 trillion. The total value of all digital commerce is expected to grow to ¥20.5 trillion in 2023. Cross-border e-commerce is growing at the same time. Major platforms, such as Kaola and Xiaohongshu, cater to increasing demand for high-quality imported products.

China's market is very large. Computer service imports totalled $17.4 billion in 2017, which represented a moderate 3.7% of total services imports.

Domestic firms are dominant in the Chinese software market, though its large size has also created significant opportunities for international competitors. Domestic firms are active internationally as well. China exported $45 billion in computer services in 2018, making it second only to India as an exporter. Foreign firms selling to Chinese customers have the greatest market share in high-end software development. There is significant demand for enterprise resource planning (ERP), mobile ERP, supply chain management, enterprise private clouds and software as a service (SaaS) solutions in particular.

Challenges for foreign firms looking to enter or grow their presence in the Chinese market include unpredictable regulations and a lack of transparency, complex and unclear practices for government procurement, protectionist policies, piracy and poor protection of intellectual property rights, and a unique business culture.

INDIA: SELLING TO THE GLOBAL LEADER IN COMPUTER SERVICE EXPORTS

India's large IT sector makes it a major market for business-to-business trade. Increasing digitalization across the country is also opening up potentially large consumer markets.

Much of India's population remains excluded from the digital economy. Nevertheless, the 34.5% of the population that used the internet in 2017 represented a very large potential market of 461.2 million individuals. By 2030, there will be an estimated 1.1 billion internet users, representing 78.8% of the country's population.

Most Indians using the internet do so through mobile devices. In 2018, mobile internet subscribers accounted for 92.6% of all internet subscribers. In 2018, there were 86.9 mobile cellular subscriptions per 100 people in India, representing significant growth from the 60.9 in 2010. Infrastructure investments and low user costs have stimulated the expanded use of mobile devices. Feature phones remain widely used, though the increasing availability of low-cost smartphones is leading to their increased use. Personal computers remain a main tool for online shopping and digital payments, however, with many customers using mobile devices to browse products before making a final purchase by computer. Complications are faced in the further development of the mobile network; in particular, the launch of commercial 5G service is expected to be later than in leading countries, due to infrastructure and financial issues.

Online purchasing is growing in popularity, led by major platforms such as Flipkart and Amazon. In general, retail and transport lead in online remote purchasing. Online payments have been facilitated by the Unified Payments Interface (UPI), a payment platform launched by the National Payments Corporation of India in 2016 that allows for seamless digital transactions. An updated version of UPI was launched in 2018 with additional features. Prominent mobile wallet providers include Paytm, MobiKwik and FreeCharge.

India has a large and globally active IT sector, which accounts for 7.9% of the country's gross domestic product (GDP) and is home to a large number of start-ups. It exported $55.5 billion in computer services in 2018, more than any other country. It is active in subsectors including software products, IT services, engineering and research and development (R&D), information technology enabled services (ITES) and business process outsourcing (BPO), hardware and e-commerce. This makes the country both a large market and a source of significant competition. Computer service imports totalled $5.6 billion in 2018. This represented a moderate 3.2% of services imports, an increase from the 1% accounted for by computer services in 2010.

UNITED ARAB EMIRATES: LARGE RETAIL, PRIVATE AND PUBLIC MARKETS IN A HIGHLY DIGITALIZED NEIGHBOUR

There are many opportunities for exporting business services to corporate clients in the United Arab Emirates, as well as very high levels of demand in consumer and public sector markets. Iranian firms can build on the strong trade links that exist with the United Arab Emirates in other sectors.

While the United Arab Emirates is a relatively small country, it is highly digitalized. In 2017, 94.8% of the population used the internet. Mobile internet use is very common. In 2018, there were 208.5 mobile cellular subscriptions per 100 people in the country. Improvements to mobile infrastructure continue to be made, with the launch of 5G service in 2019. In 2018, mobile devices were used to make 44% of digital purchases.

The United Arab Emirates is the region's leader in e-commerce as a result of its strong digital ecosystem, the presence of large domestic and international firms, government support, and high incomes. Further growth is expected in future; the total value of transactions was Dhs 44.6 billion in 2018, and is expected to grow to Dhs 71.9 in constant value terms in 2023.

The use of digital payments is spreading, marking progress towards the government's goal of creating a cashless society. Card issuers, like Abu Dhabi Commercial Bank and Emirates NBD, have recently entered into partnerships with online platforms to facilitate digital payments. International payment systems, such as Apple Pay and Samsung Pay, have also been popular since they were launched in the United Arab Emirates in 2017. Consolidation among the various actors now involved in digital payments is expected in future.

There is a high level of demand in the country. Computer service imports totalled $708 million in 2018, which represented 1% of total services imports. According to the Dubai Chamber of Commerce and Industry, total IT spending in the country was expected to total Dhs 23.1 billion by the end of 2019. The dominant energy and financial services sectors are particularly important sources of demand for business services. Demand for cybersecurity services is expected to accompany spreading digitalization.

The public sector is another area where significant growth can be expected. Significant investments are being made in building the digital economy. These include smart city initiatives, such as Smart Dubai, which focus on leveraging digitalization and using big data to improve public services.

Competition in the United Arab Emirates market includes a sizeable domestic sector. The country

exported $4.9 billion in computer services in 2018 and has high levels of entrepreneurship. Several start-up incubators and accelerators have been established, including the Dubai Technology Entrepreneur Campus, to support the emergence of new firms.

GERMANY: AN ESTABLISHED MARKET WITH OPENINGS FOR SMALLER PROVIDERS

Germany's large market is highly competitive, though niche opportunities remain to be exploited by smaller firms, which play a big role in the market for software and business services.

A highly digitalized economy, 84.4% of Germany's population used the internet in 2017. Further growth is still anticipated, however; in 2023, an estimated 73.8 million Germans will use the internet, representing 86.2% of the population.

Despite high levels of digitalization by other measures, Germans are not highly active in e-commerce, preferring traditional commerce partly as a result of trust issues. There are, however, e-commerce opportunities in the German market. New technologies, such as artificial intelligence and augmented/virtual reality are being used in retail and other consumer markets. Social media can be a powerful marketing tool. Demand in retail market segments is shifting to reflect the needs of an ageing society, including increasing interest in some forms of e-commerce offering convenience and value.

Digital payments are also relatively underdeveloped, as German customers tend to prefer using cash to mobile or card payments for small transactions. The recent entry of large digital wallet providers, such as Apple and Google, and establishment of online banks and other new firms in the market looks set to change this in future, however.

Germany is Europe's largest software market, accounting for approximately one-quarter of the continent's total software value. Computer service imports totalled $30.3 billion in 2018. This represented a relatively high 8.6% of services imports, an increase from the 5.4% accounted for by computer services in 2010. Most of Germany's computer service imports in 2017 originated in the United States (23.7%), Ireland (12.9%), the United Kingdom of Great Britain and Northern Ireland (8.4%), or the French Republic (5.8%).

Opportunities are present in a variety of subsectors, including big data, cloud computing, IT security, enterprise resource planning, smart social business platforms, and e-energy and smart grids. There is also significant competition from global industry leaders that are well established in the German market, and from a large number of flexible and specialized SMEs, including the Mittelstand, which play a major role in many sectors of the economy. With highly active domestic firms, Germany exported $34.7 billion in computer services in 2018.

IRAQ: A CHANCE TO BUILD ON EXISTING TRADING RELATIONSHIPS TO GROW WITH AN UNDERDEVELOPED MARKET

Iraq's ICT sector and market remain limited. Some opportunities exist, though much of the potential for exports by Iranian firms is likely to come about through future growth in demand. Iran's firms can leverage their country's close trading relationships and proximity to build relations and establish a presence that will allow them to benefit from this growth.

Iraq is still in the process of digitalization. In 2017, 49.4% of the population, or 18.5 million people used the internet. Growth in the total number of users has been extremely rapid, however, averaging 58.3% per year in 2010–17.

Infrastructure gaps and the underdevelopment of much of the private sector have further stifled demand for ICT services. Computer service imports totalled just $37.7 million in 2018. This represented just 0.2% of services imports, an increase from the 0.1% accounted for by computer services in 2010. Relevant activities present in the Iraqi market include e-commerce, electronic services, and software sold to individuals, businesses, private companies, non-governmental organizations, banks and government institutions.

Competition is present, though less of a challenge than in other countries and perhaps less of an issue than the complexities of the business environment. While domestic firms are active in the sector, their activity remains at a small scale. Iraq exported just $16.9 million in computer services in 2018. Challenges for firms active in the sector include the lack of clear policies and regulations, insufficient protections against monopolies, little protection of patent rights and intellectual property more generally, as well as tax rates for firms with a presence in the country.

PLAN OF ACTION

To achieve the vision and strategic objectives discussed, a robust, actionable and realistic strategic plan of action is required. This is provided below and constitutes the heart of this strategy. The plan of action is structured along the three strategic objectives described above and their operational objectives. For each objective, the plan of action outlines detailed activities and their implementation modalities, which include:

- Priority level: Priority 1 being the highest and 3 the lowest.
- Start/end dates: The desired time-frame of the activity.
- Targets: Quantifiable targets that allow monitoring of the activity from the implementation stage to completion.
- Leading implementing partners: One accountable lead institution per activity. (The institution can also have a technical role or can solely have an oversight and coordination role.)
- Supporting implementing partners: Any institution that should be involved at any stage of the activity's implementation.

Strategic objective	Operational objective	Activity	Priority	Period					Reform or project	Targets	Leading implementing partners	Supporting implementing partners
				2021	2022	2023	2024	2025				
1. Establish an enabling ecosystem for ICT SMEs and start-ups to thrive	1.1. Consolidate private and public plans and establish a monitoring mechanism	1.1.1. Establish an ICT strategy monitoring unit and committee, in close coordination with the Ministry of ICT, ITO, and the Iranian Iranian ICT Guild Organization Organization (involving Bistoon). The unit will be responsible for monitoring, and steering the yearly implementation	1						Project	• Monitoring unit and committee in place	Ministry of ICT (MoICT)	Information Technology Organization of Iran (ITO), Iranian Iranian ICT Guild Organization Organization
		1.1.2. Define a core team for each strategic objective to follow up on activities and report to the strategy committee.	2						Project	• Three core teams established	MoICT	ITO, Iranian ICT Guild Organization
	1.2. Fill the current regulatory gaps and build understanding about ICT regulation	1.2.1. Incentivize the development of self-regulatory organizations to regulate the ICT sector.	1						Project	• Investment promotion campaign carried out	MoICT	ITO, Iranian ICT Guild Organization
		1.2.2. Incentivize the development of ICT legal advisory firms to serve ICT firms and build their understanding of legal frameworks (local and international).	2						Project	• Investment promotion campaign carried out	MoICT	ITO, Iranian ICT Guild Organization
		1.2.3. Update the intellectual property (IP) protection regulation and governance to protect Iranian software.	1						Reform	• Intellectual property regulation updated to include software protection	Intellectual Property Center	ITO, Iranian ICT Guild Organization
		1.2.4. Develop a financial and technical support programme for exporters to present the various services available and financially support the acquisition of the required protection.	3						Project	• IP support programme in place	ITO	Intellectual Property Center, Iranian ICT Guild Organization
		1.2.5. List relevant policies for the ICT sector, review implementation status and consolidate remaining activities to be implemented as well as a responsibility matrix.	2						Project	• Policy monitoring and evaluation (M&E) mechanism in place	MoICT	ITO, Iranian ICT Guild Organization
	1.3. Increase public–private collaboration on ICT projects	1.3.1. Launch a short set of pilot public–private partnership (PPP) megaprojects, through consortiums of Iranian ICT start-ups.	2						Project	• At least five megaprojects launched	Iranian ICT Guild Organization	MoICT, Iranian Research Organization for Science and Technology (IROST), Center for Development of Technology and Advanced Industries (CDTAI)

Strategic objective	Operational objective	Activity	Priority	Period					Reform or project	Targets	Leading implementing partners	Supporting implementing partners
				2021	2022	2023	2024	2025				
1. Establish an enabling ecosystem for ICT SMEs and start-ups to thrive	1.3. Increase public–private collaboration on ICT projects	1.3.2. Train private actors in market procedures through a mandatory legal training programme online; train IT experts in public administration to improve the technical quality of call for tenders, or use external expertise to the listing of the specifications.	2						Project	• Regular training for firms and public officials about procurement	MoICT	ITO, Iranian ICT Guild Organization, Plan and Budget Organization
		1.3.3. Reform vendor selection mechanism for ICT firms and increase transparency of the selection.	1						Reform	• Reform of the mechanism carried out	MoICT	ITO, Iranian ICT Guild Organization, Plan and Budget Organization
		1.3.4. Train civil servants in vendor selection in the ICT sector.	1						Project	• Regular mandatory training module in place for public officials	MoICT	ITO, Iranian ICT Guild Organization, Plan and Budget Organization
	1.4. Facilitate and incentivize export of Iranian software	1.4.1. Create an export rebate fund from the import tariffs, enabling export barriers rebate. This will ensure the competitiveness of the Iranian offer.	2						Project	• Export rebate fund in place	MoICT	ITO, Iranian ICT Guild Organization, Plan and Budget Organization
		1.4.2. Credit rating being a condition on most foreign markets for ICT firms, there is a need to establish credit rating mechanism within Iranian banks.	2						Project	• Credit rating mechanism in place	Ministry of Economic Affairs and Finance (MoEAF)	MoICT, ITO, Iranian ICT Guild Organization
2. Further develop skilled human capital and spur innovation	2.1. Retain Iranian ICT specialists	2.1.1. Develop a short-term approach to retain developers in Iran through: • Subventions to ensure a more competitive salary; • Incentives and perks around work environment (ex: stock options for the employees).	1						Project	• Retention programme implemented across firms	ITO	Iranian ICT Guild Organization, MoICT
		2.1.2. Incentivize on-the-job training through the provision of grants and tax rebates to companies that train workers or that require their staff to train regularly and cover fees for external training institutions.	2						Project	• Rebates in place for firms implementing on-the-job training	ITO	Iranian ICT Guild Organization, MoICT
		2.1.3. Develop national or international awards for local developers by an institution to keep them in Iran.	2						Project	• Awards schemes in place	ITO	Iranian ICT Guild Organization, MoICT
		2.1.4. Develop a directory for young graduates in the ICT sector, categorized by field of expertise, and allow firms to contact them for recruitment. Advertise the employment potential for new students.	1						Project	• Directory of ICT sector graduates in place	Iranian ICT Guild Organization	ITO, MoICT

Strategic objective	Operational objective	Activity	Priority	Period					Reform or project	Targets	Leading implementing partners	Supporting implementing partners
				2021	2022	2023	2024	2025				
2. Further develop skilled human capital and spur innovation	2.2. Increase number of graduates in ICT specialties	2.2.1. Develop broadscale training programmes for young graduates/unemployed in the largest cities and connect graduates directly with key enterprises in the sector.	2						Project	• Large-scale training programme implemented yearly	Ministry of Education (MoE)	Iranian ICT Guild Organization
		2.2.2. Orientation of youth towards ICT carriers at early education level through the development of a campaign about the high-yield carriers in the ICT sector, and the high employability after such studies.	1						Project	• Promotional campaign in place in primary/secondary schools	MoE	Iranian ICT Guild Organization, ITO
	2.3. Build export skills and knowledge within ICT firms	2.3.1. Build project management capacities in ICT firms through a broad management capacity building programme. It should particularly focus on training on digital business management and innovation (digital project management and design thinking), the recruitment of international trainers specializing in digital services/software trade, the attraction of digital service companies, and a coaching programme.	2						Project	• Practical business management capacity building programme in place	ITO	Iranian ICT Guild Organization, MoE
		2.3.2. Foster internationalization of firms by bringing foreign workers with experience in ICT exports (e.g. the programme in which 3,000 Armenians were brought in and employed among different ICT firms).	3						Project	• Agreements with at least two other countries in place	Center for Innovation and Technology Cooperation	ITO, Iranian ICT Guild Organization
		2.3.3. Establish an Iranian ICT nomad network that would use the capacities and connections of expats to reinforce export capacities of local ICT firms.	1						Project	• "Iranian ICT nomad" network in place	ITO	Center for Innovation and Technology Cooperation, Iranian ICT Guild Organization
		2.3.4. Develop training on contract types for export, negotiation skills targeting the marketing and prospection teams in ICT firms.	2						Project	• Training available in at least 30% of accelerators	ITO	Iranian ICT Guild Organization, MoE
		2.3.5. Use successful exporting companies as mentors and trainers for firms willing to engage in exports.	2						Project	• Identify best practice exporters • Integrate them into training and as mentors	ITO	Iranian ICT Guild Organization, MoE

Strategic objective	Operational objective	Activity	Priority	Period					Reform or project	Targets	Leading implementing partners	Supporting implementing partners
				2021	2022	2023	2024	2025				
2. Further develop skilled human capital and spur innovation	2.4. Improve the quality of the start-up and SME ecosystem and support	2.4.1. Orient the creation of a new entrepreneurship support ecosystem in the late-stage SME/start-up incubation.	1						Project	• Promotional campaign carried out	Vice Presidency for Science and Technology (VPST)	IROST, Industrial Management Institute (IMI), ITO
		2.4.2. Develop strict eligibility criteria for accelerator-type facilities to be certified. Establish a periodic re-certification scheme for accelerators, requiring them to demonstrate a sufficient amount of success stories to remain active.	1						Reform	• New accelerator certification scheme in place	VPST	IROST, IMI, ITO
		2.4.3. Integrate export concepts in the early stage of start-up/SME incubation to familiarize entrepreneurs with the concepts and include it in their feasibility studies and long-term plans.	2						Project	• Training available in at least 30% of accelerators	Trade Promotion Organization of Iran (ITPO)	ITO, VPST, IROST, IMI, ITC
	2.5. Support innovation and uniqueness of Iranian software solutions	2.5.1. Bring winners of local start-up/SME awards to regional awards for innovative solutions.	2						Project	• At least yearly presence of national award winners abroad	Center for Innovation and Technology Cooperation	ITO, Iranian ICT Guild Organization, VPST
		2.5.2. Establish collaboration with highly innovative friendly countries such as China and connect Iranian SMEs with Chinese innovation frameworks.	3						Project	• At least three new collaborations in place	Center for Innovation and Technology Cooperation	ITO, Iranian ICT Guild Organization, VPST
		2.5.3. Incentivize new investments in innovative areas and new products with high potential such as software engines.	3						Project	• Investment promotion campaign carried out	Center for Innovation and Technology Cooperation	IROST, IMI, ITO, Innovation and Prosperity Fund

Strategic objective	Operational objective	Activity	Priority	Period					Reform or project	Targets	Leading implementing partners	Supporting implementing partners
				2021	2022	2023	2024	2025				
3. Consolidate the competitiveness of ICT firms to enhance export readiness	3.1. Spread certification of Iranian ICT products	3.1.1. Set up a business certification programme for offshore markets. This programme will focus on the certifications needed for software developers, including facilitating access to certification to ISO 27001 and 22000. The following other certifications are generally most requested by suppliers in the sector: Information Technology Infrastructure Library (ITIL), Microsoft, Oracle, NetSuite, International Business Machines Corporation (IBM) and Checkpoint, etc. In connection with the development of the cybersecurity offer previously mentioned, these types of certifications should be considered by companies: • Certifications products/services; • System certifications; and • Individual certifications (should also include those in project management).	1						Project	• Certification programme carried out for existing and promising exporters	ITO	MoICT, Iranian ICT Guild Organization
		3.1.2. Develop a ranking for export maturity of a company in order to classify existing SMEs/start-ups and have a better understanding on which to focus export sensitization activities.	2						Project	• Export maturity ranking in place	ITPO	ITO, Iranian ICT Guild Organization, VPST, IROST, IMI
	3.2. Focus investment in ICT firms with high potential for export	3.2.1. Focus investments into innovative spinoffs of globally successful solutions.	2						Project	• Investment promotion campaign carried out	Center for Innovation and Technology Cooperation	IROST, IMI, ITO, Innovation and Prosperity Fund
		3.2.2. Develop entire package concessions for investment into the ICT sector.	1						Project	• Package concessions in place	MoICT	Innovation and Prosperity Fund, ITO
		3.2.3. Target state-owned enterprises (SOEs) and large Iranian oil- and gas-related companies to establish or invest in corporate venture capitals (CVCs). Prepare possible solutions that could be procured to those firms.	1						Project	• Business promotion campaign carried out	Center for Innovation and Technology Cooperation	IROST, IMI, ITO, Innovation and Prosperity Fund
		3.2.4. Involve Angel investment groups to support the ICT sector.	2						Project	• Investment promotion campaign carried out	ITO	Iranian ICT Guild Organization, MoICT

Strategic objective	Operational objective	Activity	Priority	Period					Reform or project	Targets	Leading implementing partners	Supporting implementing partners
				2021	2022	2023	2024	2025				
3. Consolidate the competitiveness of ICT firms to enhance export readiness	3.3. Spread the use of EMCs	3.3.1. Incentivize the development of Iranian export management companies and connect existing ones with the high-potential export SMEs/start-ups.	1						Project	• Investment promotion campaign carried out	ITPO	MoICT, Iranian ICT Guild Organization, ITO
		3.3.2. Develop and monitor export management companies (EMCs) and bring foreign EMCs (Sujits from Japan).	2						Project	• At least five international EMCs brought to Iran	ITPO	MoICT, Iranian ICT Guild Organization, ITO
		3.3.3. Include EMCs as knowledge-based companies (KBCs) within the Iranian National Innovation Fund.	2						Project	• At least five new EMC within the National Innovation Fund	Innovation and Prosperity Fund	ITPO, MoICT, Iranian ICT Guild Organization, ITO
	3.4. Establish foreign networks for ICT export-ready firms	3.4.1. Use the Iranian ICT nomad network to promote Iranian ICT firms in their surroundings and serve as market connectors for Iranian firms.	2						Project	• Promotional campaign carried out	ITO	Iranian ICT Guild Organization, MoICT, Iranian ICT nomad network
		3.4.2. Establish corridors and export hubs in target markets for ICT.	2						Project	• At least three countries with Iranian corridors	ITO	Iranian ICT Guild Organization, MoICT, ITPO
		3.4.3. Leverage the Iranian diaspora network to transfer their experiences and network to the ICT firms.	3						Project	• Regular communication with diaspora established	Center for Innovation and Technology Cooperation	Iranian ICT nomad, IROST, IMI, ITO, Innovation and Prosperity Fund
		3.4.4. Update the directories of ICT companies in Iran in at least English and Arabic (and then in other languages).	1						Project	• ICT directories updated and translated	ITO	Iranian ICT Guild Organization
		3.4.5. Promote the price advantage of Iranian ICT firms in international markets to get 2nd and 3rd hand development projects from other countries, including in BPO.	1						Project	• International promotional campaign carried out	ITO	Iranian ICT Guild Organization, MoICT
	3.5. Raise awareness of Iranian ICT sector in key markets	3.5.1. Develop a promotional campaign to pursue constant efforts to keep Iran in international rankings, journals, international exhibitions or conferences, beyond the national level. Government officials should also be mobilized and refer to concrete projects or national champions to be able to highlight Iranian expertise during official travel.	1						Project	• International promotional campaign carried out	ITO	Iranian ICT Guild Organization, MoICT
		3.5.2. The diaspora working in the sector should be integrated in this communication strategy, and be considered the best ambassadors placed to promote the sector across borders of the region.	2						Project	• Iranian ICT Nomad network involved	ITO	Iranian ICT Guild Organization, MoICT, Iranian ICT nomad network

Strategic objective	Operational objective	Activity	Priority	Period					Reform or project	Targets	Leading implementing partners	Supporting implementing partners
				2021	2022	2023	2024	2025				
3. Consolidate the competitiveness of ICT firms to enhance export readiness	3.6. Support firms to access regional and international markets	3.6.1. Provide capacity building to firms in the following domains: • Review the proposed products and their alignment to the markets; • Support the positioning and marketing of the offer (or how to submit an offer); • Support sales planning and identification of distribution channels (depending on the size of the company).	1						Project	• Capacity building programme in place and runs yearly	ITO	Iranian ICT Guild Organization, MoICT, ITPO
		3.6.2. Set up a market surveillance unit on the software market in the regional and international markets and provide information through the Iranian ICT Guild Organization to member organizations. The market information provision will be accompanied by online training tools about the use of the market intelligence.	2						Project	• Market surveillance unit in place	Iranian ICT Guild Organization	ITPO, ITO
		3.6.3. Establish a trade accelerator in connection with the Ministry of Industry, Mine and Trade.	1						Project	• Trade accelerator created	ITPO	ITO, VPST, IROST, IMI, ITC
		3.6.4. Provide language courses, in particular English and Arabic, for IT entrepreneurs. This should particularly target managers, marketing and prospecting staff. This can be done in strengthening the accessibility of online language courses and by supporting the translation of promotional material of companies.	1						Project	• Yearly language courses available to exporters	ITPO	ITO, Iranian ICT Guild Organization

GUIDELINES ON STRATEGY IMPLEMENTATION

The objective of Iran's ICT Strategy is to create an enabling environment for the ICT sector and digital economy to realize its potential and contribute to the country's exporting, growth and development while also supporting broader digital change in Iran's economy and society. Achieving this ambitious objective will depend on the implementation of the activities defined in this strategy.

It is the translation of priorities into implementable projects that will contribute to achieving the substantial increase in export competitiveness and in export earnings envisaged under the strategy. These will be driven by reforming the regulatory framework, optimizing institutional support to exporters and strengthening firms' capacities to respond to market opportunities and challenges. Allocation of human, financial and technical resources is required to efficiently coordinate, implement and monitor work on the strategy.

Successful execution of activities will depend on stakeholders' abilities to plan and coordinate actions in a tactical manner. Diverse activities must be synchronized across public and private sector institutions to create sustainable results. Therefore, it is necessary to foster an adequate environment and create an appropriate framework for the strategy's successful implementation.

Key to achieving the targets will be coordination of activities, monitoring progress and mobilizing resources for implementation. To that effect, industry representatives recommended that an advisory committee of public sector and business representatives for the ICT sector and digital economy be rapidly established, operationalized and empowered. The advisory committee is to be responsible for overall coordination, provision of policy guidance and the monitoring of industry development along the strategic orientation.

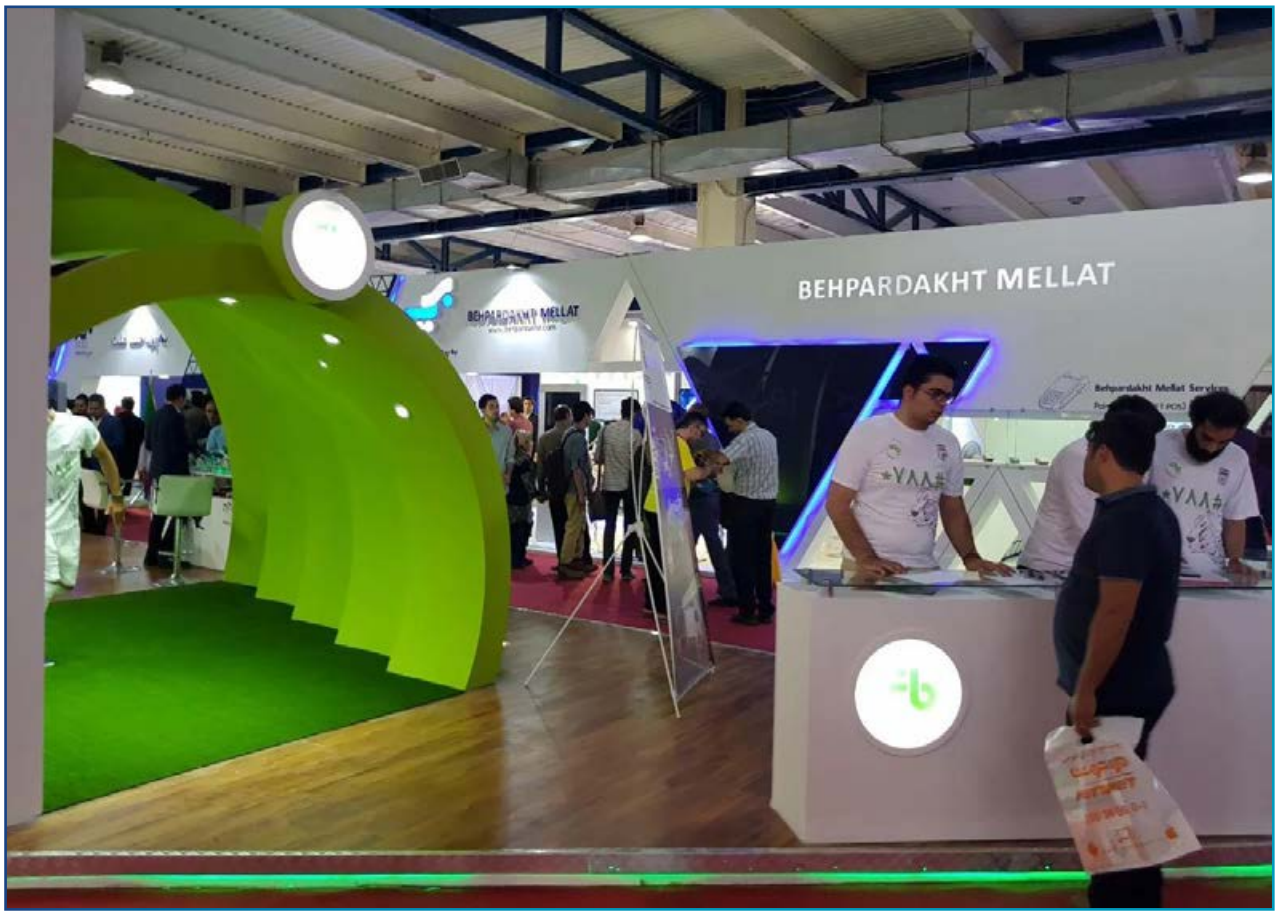
- It is recommended that the advisory committee be empowered to meet quarterly and to implement the following functions:
- Create a shared understanding of key market challenges and opportunities facing the sector;
- Set goals and targets that, if achieved, will strengthen the sector's competitive position and enhance Iran's overall capacity to meet the changing demands of markets;
- Propose key policy changes to be undertaken and promote these policy changes among national decision makers;
- Support the coordination, implementation and monitoring of activities in the sector by the government, business, institutions or international organizations to ensure alignment to goals and targets, as required to contribute to resource identification and alignment.

As part of the overall trade policy and NES design process, it has been recommended that an inter-ministerial and multisectoral business council be organized and structured to address overall challenges and opportunities to Iran's trade performance. It is recommended that chairs of advisory committees, such as that for the ICT sector and digital economy, be members of the council to consult on key trade thematic areas ranging from policy to regulations and trade negotiations.

The presence of the advisory committee to oversee the strategy's implementation is a key success factor, but it is not sufficient to effectively fulfil its assigned functions. The strategy's success depends on business sector support and participation in implementation, proactive networking and communication, and resources for implementation (Table 8).

Table 8: Key success factors for effective implementation

Factor	Details
Business sector support and participation in implementation	The business sector clearly expressed its willingness to contribute, directly or in partnership with public institutions, to the implementation of the strategy. Their implementation efforts can range from providing business intelligence to institutions to contributing to project design, promotion and branding, or policy advocacy, etc. In brief, the business sector's practical knowledge of sector operations is essential to ensuring that the strategy remains aligned to market trends and opportunities.
Proactive networking and communication	The key implementing institutions detailed in the plan of action need to be informed of the content of the strategy and the implications for their programming over its implementation period. This networking and communication is essential to build further ownership and to provide institutions with the opportunity to confirm the activities they can implement in the short to long term. It will be important for the members of the advisory committee and other institutions to reach out to relevant institutions nationally to create awareness and support for the development of the ICT sector and digital economy.
Resources for implementation	The advisory committee, in collaboration with other institutions, will need to leverage additional support for efficient implementation. Effective planning and resource mobilization is indispensable in supporting strategy implementation. Resource mobilization should be carefully planned and organized. As the ICT sector and digital economy is a priority of the NES, the government should define annual budget allocations and supports to drive the industry growth. This commitment will demonstrate clear engagement towards strengthening the sector and encourage private partners to support development. In addition to national budget support, resource identification will require the effective targeting of foreign investors in line with the strategy's priorities. Investment flows to Iran should also be considered as a valuable driver of strategy implementation and overall industry development. The various implementation modalities detailed will determine the success of the strategy's implementation. However, high-level support from the government, in collaboration with strong championship by the business sector, will be the real driver of successful strategy implementation.



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ANNEX I: GLOBAL SERVICES LOCATION INDEX

A.T. Kearney's Global Services Location Index (GSLI) was first created in 2004 as a tool to help global companies identify the best locations for delivery or sourcing of knowledge services. Over the years, the GSLI has become recognized as the premier barometer for evaluating the relative competitiveness of countries as exporters of knowledge services. The original index covered just 12 countries, but the index now includes 50 countries. Unfortunately, Iran has never been included in the index, since global trade restrictions mean that most global companies have never considered Iran as a viable source of ICT expertise.

To avoid subjective bias, the GSLI is based on 44 metrics from independent sources (Table 9). Regardless of whether or not a country is already a successful exporter, the index aims to assess the country's fundamental competitiveness as a location for export of knowledge services, based on four broad factors: financial attractiveness, people skills and availability, business environment, and digital readiness.

Table 9: Metrics used in the Global Services Location Index

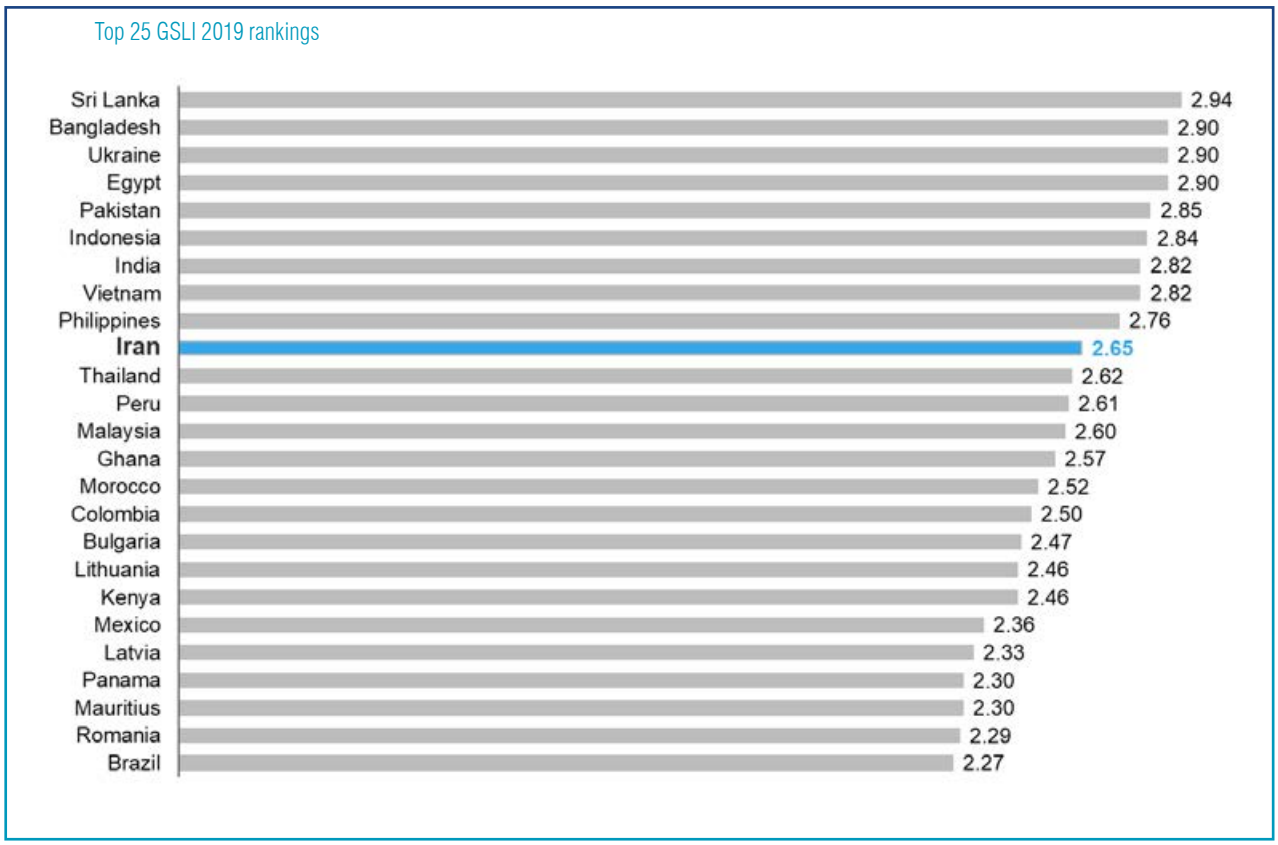
Category (% of total)	Country characteristics	Metrics used
Financial costs (35%)	• Compensation costs	• Average wages • Median compensation for sample positions (programmer, BPM analyst, manager)
	• Infrastructure costs	• Average cost of infrastructure (rent, electricity, telecom) • Blended travel cost to major customer destinations
	• Tax and regulatory costs	• Relative tax burden, costs of corruption and exchange rate movements
People, skills and availability (25%)	• Cumulative IT and BPO experience and skills	• Estimation IT and BPO market size and growth • Quality certification of local IT and BPM operations • Quality ratings of local management schools
	• Labour force availability	• Size of total workforce and tertiary educated workforce
	• Educational skills and language	• Scores on standardized education and language tests
	• Attrition risk	• Relative industry growth and unemployment rates
Business environment (25%)	• Economic and political environment	• Business and political environment ratings, regulatory burden, government support • Foreign Direct Investment Confidence Index ranking
	• Country infrastructure	• Overall infrastructure quality, quality of telecom, internet, electricity
	• Cultural adaptability	• "Personal contract" portion of A.T. Kearney's Globalization Index
	• Security of intellectual property	• Ratings of IP protection and ICT laws, software piracy rates
Digital readiness (15%)	• Digital skills	• Digital skills of the workforce
	• Legal adaptability	• Digital readiness of legal framework, cybersecurity protections
	• Start-up activity	• Total value of venture capital investments in digital start-ups
	• Digital outputs	• Value of digital production

Source: ITC

Iran is not included in some of the global data sources that are used in the index. However, it was possible to find good data or at least reasonable proxy data for 90% of the metrics used in the index and, hence, to estimate where Iran would rank if it were included in the index.

Iran scores very well in terms of financial attractiveness (Figure 23). Compensation costs for relevant knowledge services positions, as well as infrastructure costs (office rent and electricity, etc.) are among the lowest in the index. Iran does not score so well in terms of relative tax burden and regulatory costs, but would still rank among the top 10 countries in terms of overall financial attractiveness.

Figure 23: Financial attractiveness

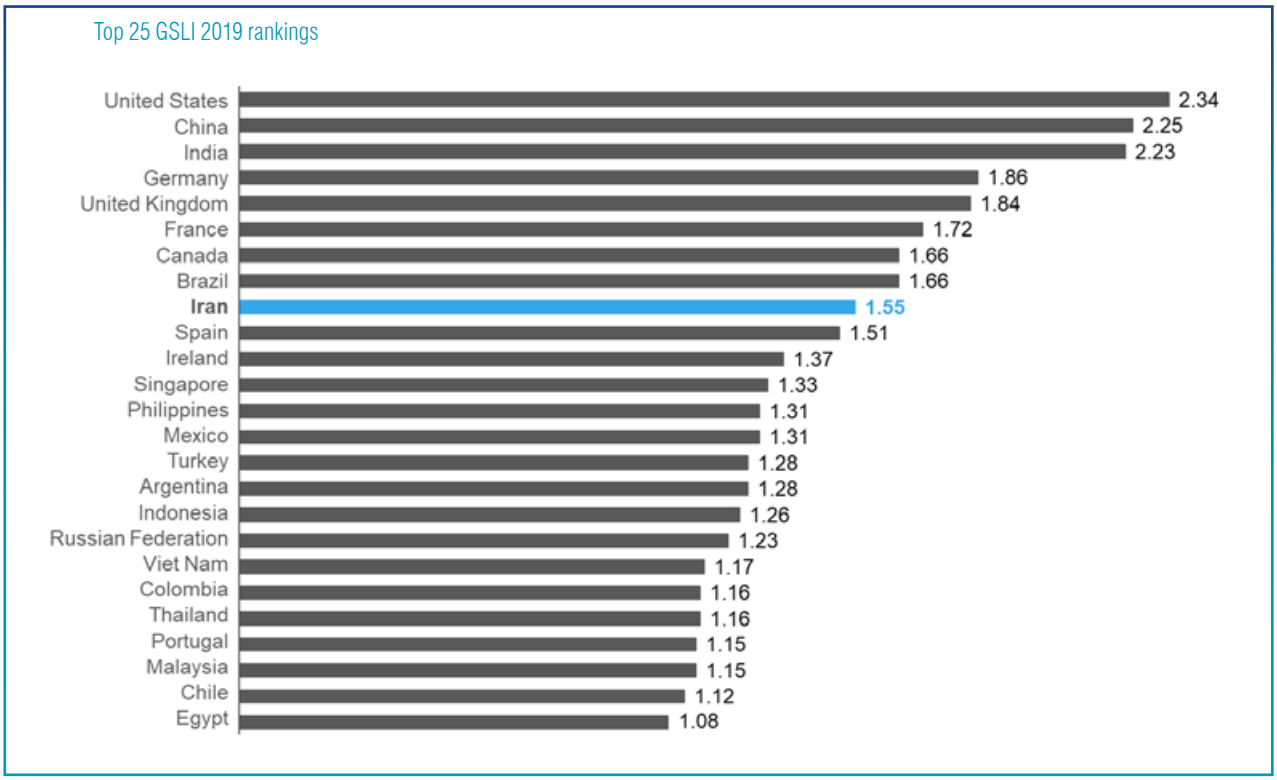


Source: ITC

Iran scores particularly well in terms of people skills and availability (Figure 24). Despite relatively mediocre scores in international standardized tests of educational attainment and in international certifications, Iran's large and youthful workforce, abundant supply of science, technology, engineering and mathematics (STEM) graduates (ranking 5th in the world) and low attrition rates make the country one of the top 10 in terms of people skills and availability.

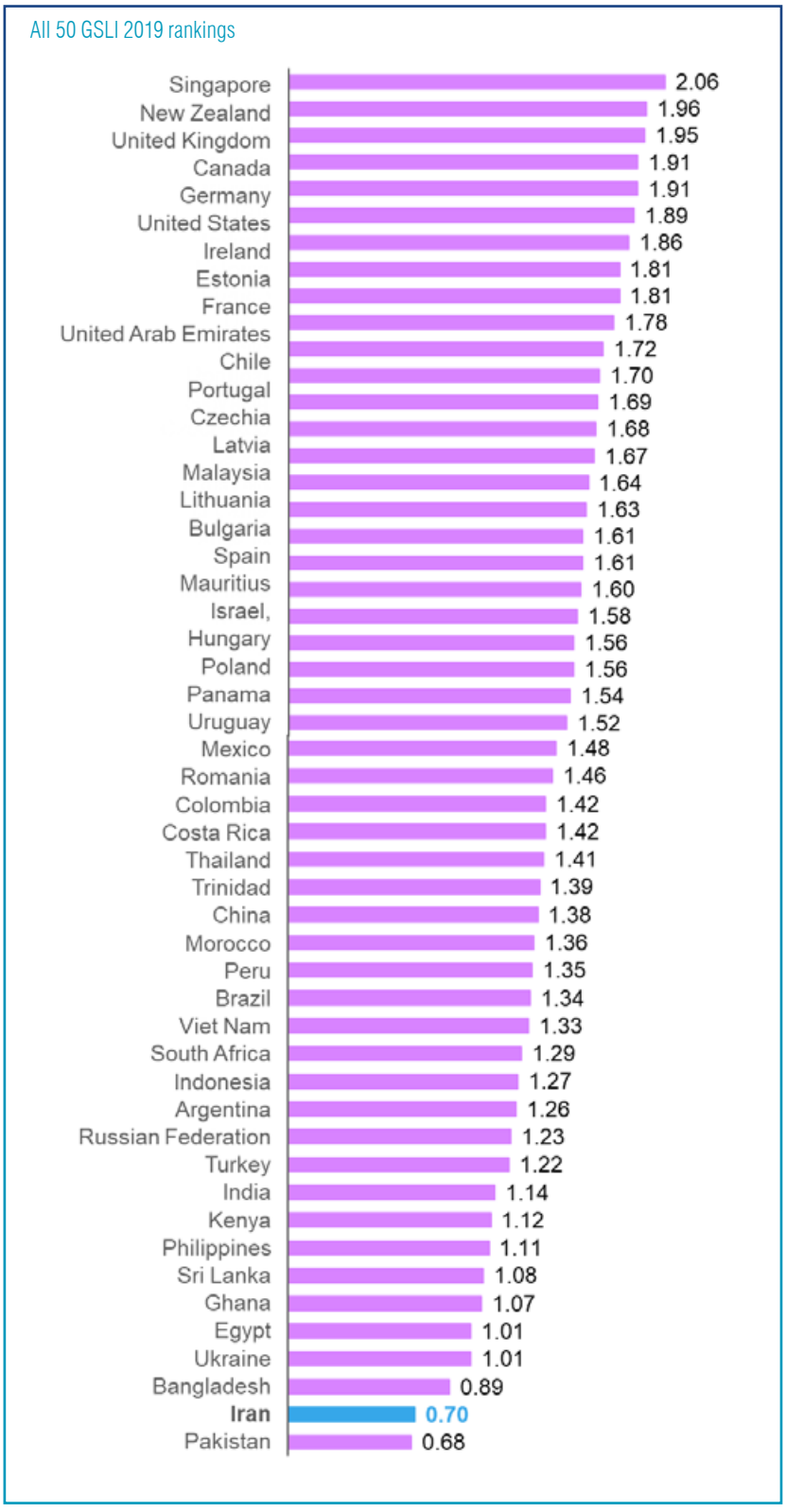
Iran scores very poorly – among the worst in the index – in terms of business environment (Figure 25). Given that much of the business environment score is based on international metrics of investor confidence, business risk and the country's global integration, this is not surprising. However, Iran also scores poorly in terms of regulatory burden, lack of intellectual property protection and the effectiveness of government support for the ICT sector.

Figure 24: People skills and availability



Source: ITC

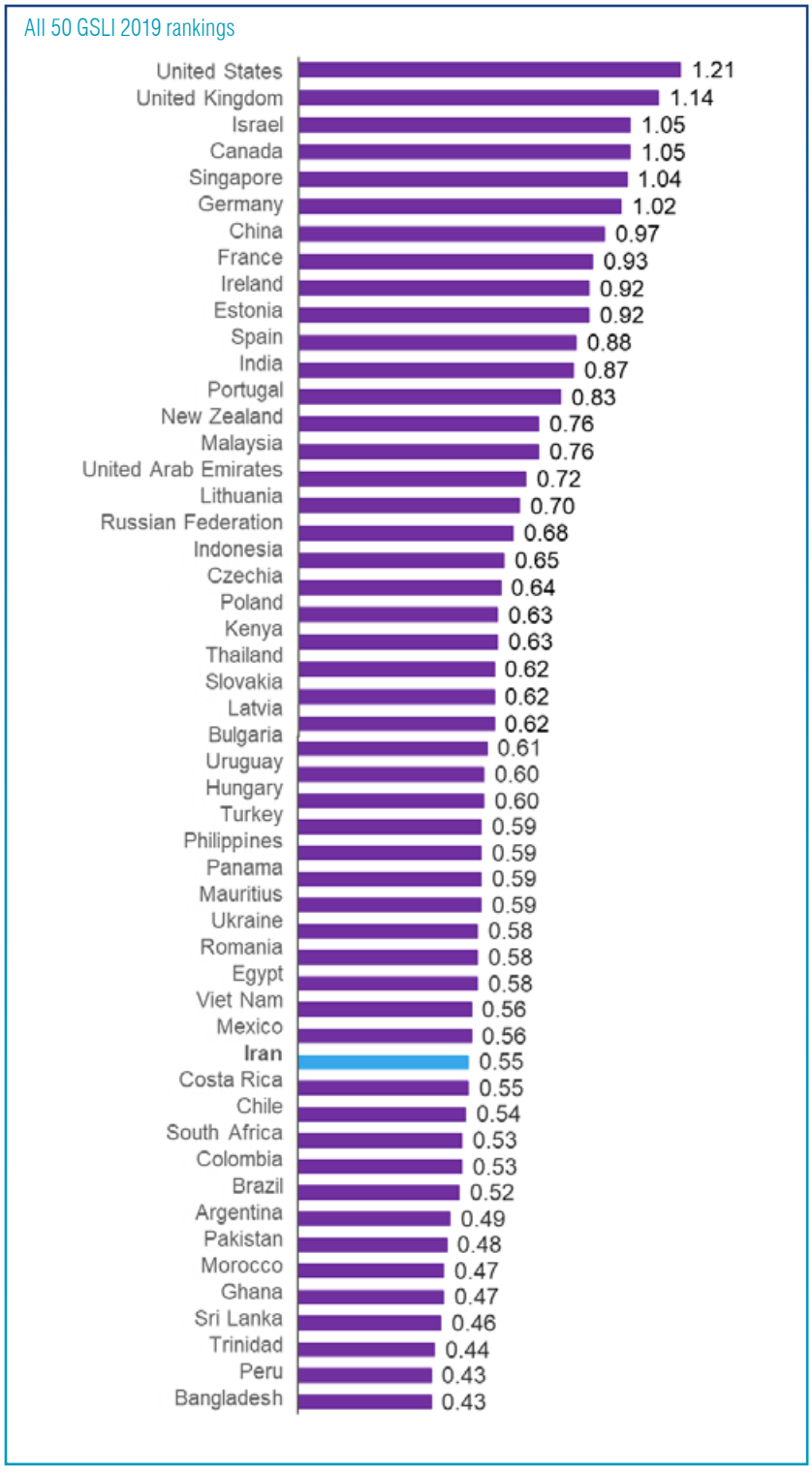
Figure 25: Business environment



Source: ITC

Iran also scores poorly in terms of digital readiness (Figure 26). The extent of digital skills in the workforce is not the best in the world, but it is reasonable, and the scale of local consumption of digital products such as e-commerce and fintech is relatively large. However, the development of digital enterprises in the country is held back by limited availability of venture capital for start-ups, and by relatively limited adaptation of legal frameworks to new digital business models.

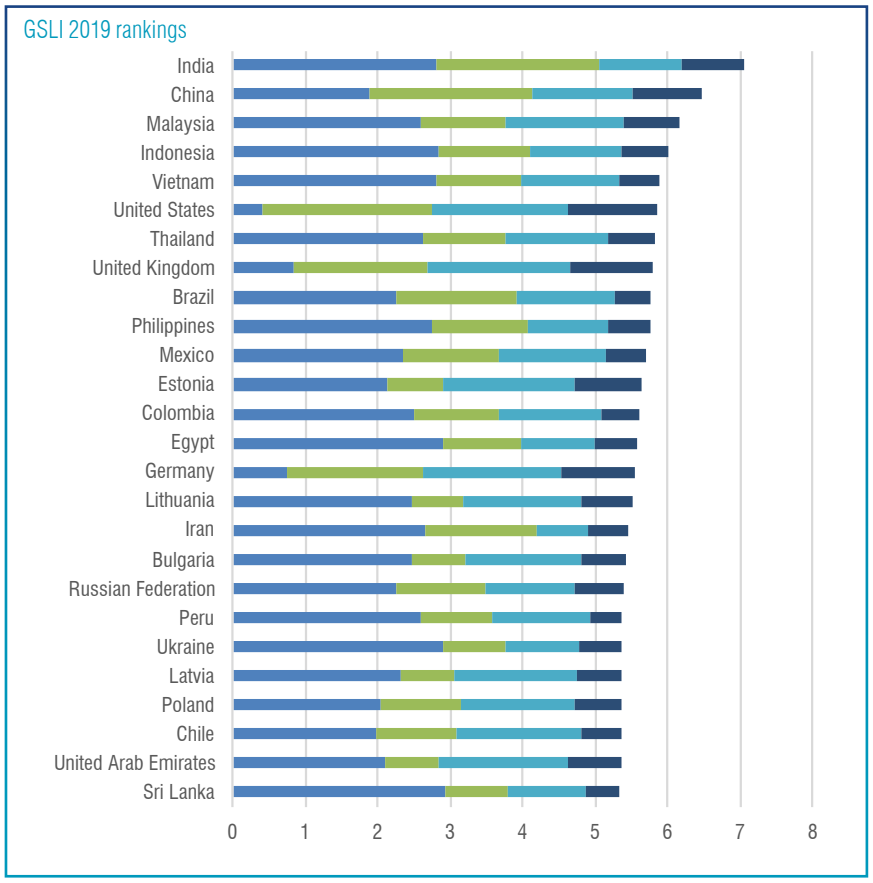
Figure 26: Digital readiness



Source: ITC

Despite these weaknesses in Iran's business environment, Iran would still rank among the top 20 locations worldwide in terms of its competitiveness as a location for export of ICT and other knowledge services (Figure 27). Given Iran's population size, ideal location (at the crossroads of Europe, Asia and the Middle East), and historical prowess in technological innovation, this is not surprising: if it were not for external and internal business constraints, there is no good reason why Iran should not rank alongside emerging knowledge services powerhouses like India, China, the Philippines, Brazil and Egypt.

Figure 27: Top 25 countries



Source: ITC

ANNEX II: PRIORITY MARKET AND PRODUCT DETERMINATION

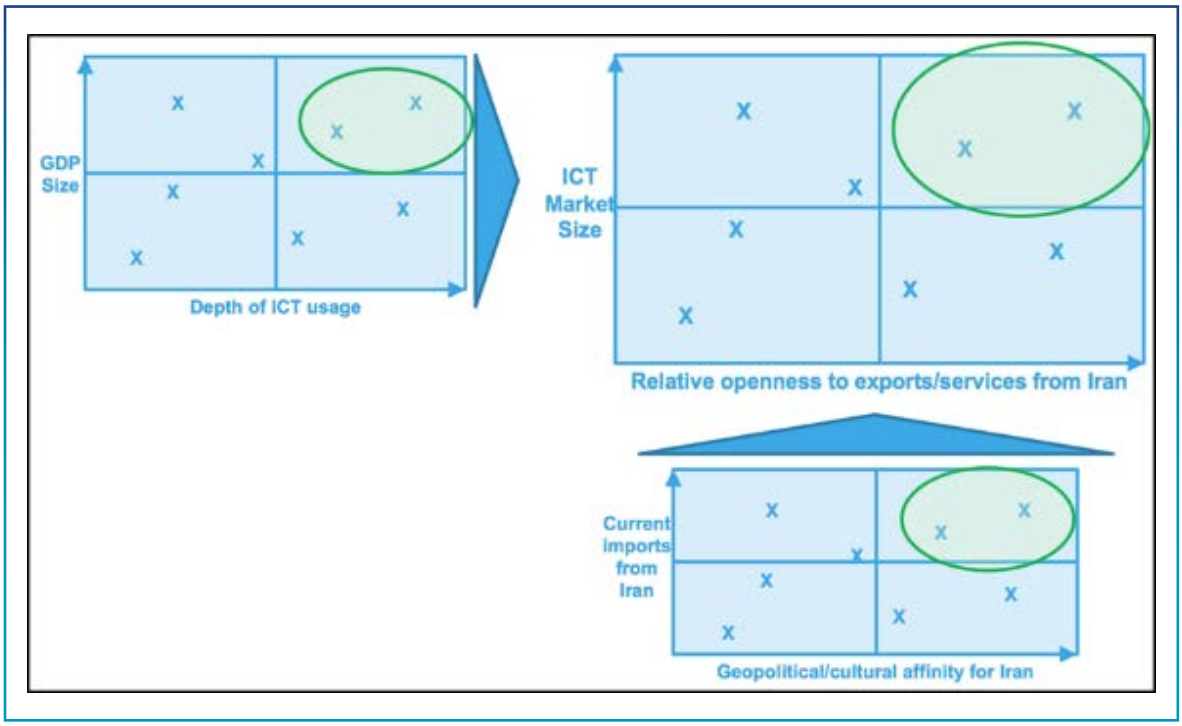
The key to identifying priority markets and segments for driving exports of ICT services and knowledge services from Iran is to work out how to turn Iran's competitive challenges (external sanctions and internal business constraints) to its advantage. There seem to be three broad strategies for overcoming these challenges:

- Focus on markets and customers that are less susceptible to international restrictions:
  - Immediate neighbours with positive relations, many of which are small markets, but offer potential to develop a track record managing international customers;
  - Central Asia and the Commonwealth of Independent States (CIS) more broadly;
  - China, India and other South Asian Association for Regional Cooperation (SAARC) countries;
  - European Union countries, particularly Germany and Scandinavia.

- Given restrictions on traditional financial transactions, develop expertise in non-traditional fintech solutions:
  - Blockchain currencies;
  - Barter transactions;
  - Islamic finance.
  - Seek opportunities for secondary outsourcing:
  - Leverage skill base and low costs to work on subcontracts for firms in India and elsewhere with large outsourcing contracts;
  - Promote freelance outsourcing via online exchanges like Upwork.

In terms of priority geographic markets, there is a trade-off between those markets that offer the greatest scale and growth potential and those that are most likely to be open to exports from Iran (Figure 28). The countries that have the strongest trade relations with Iran tend to have rather small markets for ICT services. On the other hand, customers in countries like Germany and China may not be averse to buying services from Iran in principle, but, in practice, these are markets with intense competition and, all else being equal, they may prefer to choose lower-risk and more stable suppliers. As such, some of the neighbouring countries that have positive trade relations with Iran and relatively developed ICT usage, but where the ICT sector is subject to less intense competition than in China or Germany, may offer strong prospects.

Figure 28: A framework for prioritizing target markets



The three selected value chains focused on in this strategy are the three largest and fastest-growing sub-segments of ICT services. However, as target niches, they are rather broad and undifferentiated. Every competing country claims strong skills in these areas and can point to successful local examples – software development for local corporates and government agencies, local payment solutions in fintech, and local marketplaces for e-commerce, etc.

Iran's ICT sector needs to identify niches where it can claim distinctive strengths. Identifying areas of distinctive strength does not preclude firms from continuing to do well outside these areas – it just helps to become known as a centre of expertise in certain areas. In the Democratic Socialist Republic of Sri Lanka, for example, the industry has chosen to focus on promoting certain clusters of expertise that have evolved partly as a result of the country's historical strengths in certain customer industries (e.g. finance and accounting, apparel and tourism) or as the result of the early success of individual pioneer companies (e.g. MillenniumIT, CakeLab, and SymCentric) (Table 10).

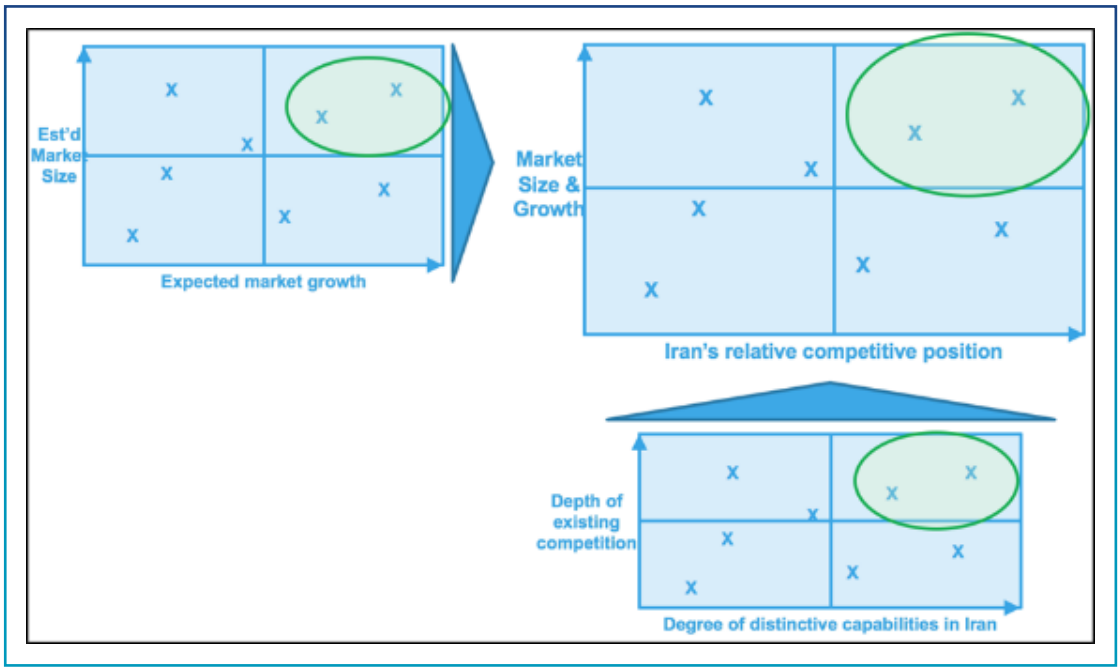
Table 10: Clusters of expertise in Sri Lanka based on historical industry links and individual success stories

Historical accounting pedigree	Specializing in finance and accounting solutions and outsourcing (FAO)
Well-established tourism sector	Booking systems and loyalty management for airlines, hotels and travel agencies
Leading apparel sector	Inventory, logistics and fulfilment systems
Millennium/LSE	Global leader in software for stock exchanges
WNS/Aviva	Integrated solutions for insurance sector
CakeLab/Sysco	Global leader in POS solutions for retailers
SimCentric	Virtual reality simulations for defence organizations

Similarly in Iran's case, stakeholders need to identify areas of distinctive competence within the broad areas of software development, fintech and e-commerce (Figure 29).

- Can Iran go beyond focusing on fintech and e-commerce to claim distinctive expertise in developing and deploying e-commerce and fintech solutions using non-traditional financial instruments, such as blockchain currencies, barter transactions and Islamic financial instruments, etc.?
- Can Iran go beyond a generic software development positioning to claim a distinctive track record or capability in developing software for specific industry verticals or horizontal solutions, such as software systems for oil and gas companies, cybersecurity and encryption, software for biotech and nanotech research and development (R&D), and cultural/archaeological digitization and archiving?
- Beyond pure ICT, given Iran's historic role as a supplier of doctors, engineers and other professionals to the region and to the world, can Iran develop a distinctive position as a regional centre for remote/online knowledge services in medical diagnostics, engineering services, computer-aided design (CAD) and similar areas?

Figure 29: A framework for prioritizing niche activities



Again, stakeholders need to work together to prioritize these target niches and software industry verticals, based on their relative size and growth and Iran's relative competitive position within these niches, addressing questions including:

- Relatively, how large and fast growing is the global market?
  - » How large is the estimated global market? How fast is it growing?
  - » Are there reasons why we expect demand to accelerate in the future?
- Relatively, how well developed is the competition?
  - » Quite well developed (e.g. blockchain exchanges, Islamic finance portals, or software solutions for the oil and gas industry) or not so well-developed (e.g. fintech solutions for barter transactions or software solutions for archaeologists).
- To what extent can Iranian companies claim distinctive capabilities, despite the competition?
  - » For example, does Iran's unique geology or the sanctions regime mean that oil and gas ICT systems have features that other providers do not have?

Given international sanctions restricting the ability of Iranian ICT firms to sell their services or solutions direct to customers in some of the largest ICT markets, the other export development channel to explore is the option of secondary outsourcing by researching trends in outsourcing contracts, prioritizing their fit with the capabilities of Iranian firms and the primary contractors' likely openness to Iranian subcontracting, preparing customized pitches, and reaching out directly to key decision makers at the primary contractor level.

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