5 Innovation in the business sector in Kuwait

This chapter presents the business innovation activity in Kuwait. It starts with some background concerning the diversification issue and the imperative for Kuwait to develop into a knowledge-based economy and society. It then gives a brief overview of the characteristics of an efficient business innovation system, based on international experience, discussing the role of research and development in enterprises, innovative entrepreneurship, knowledge diffusion, and business-academia linkages. The chapter then analyses the structure of the Kuwaiti business sector, which is dominated by state-owned enterprises in oil and other strategic sectors, with a relatively underdeveloped small and medium-sized enterprise sector. The chapter moves on to discuss the innovation and R&D performance in enterprises, followed by an analysis of business-academia co-operation and linkages. The final section discusses Kuwaiti policies in favour of innovation and R&D in the business sector, which has many opportunities for improvement.

5.1. Background

Kuwait is facing a diversification imperative. As discussed in Chapter 2, the oil rent has enabled Kuwait to develop its economy throughout much of the past century, and attain high levels of prosperity and human development. Kuwait's oil reserves are still abundant, and will last for another century at current production levels.

Peak oil supply is no longer widely supported, as unconventional oil sources complement classical ones (Bardi, 2019). Nevertheless, peak-oil demand seems more likely, in particular in the wake of increasing global concerns about carbon emissions, complemented by the development of renewable energy sources and alternative mobility solutions. Peak oil demand could set on anywhere between 2025 and 2040 according to different scenarios. It might also go through cycles according to price evolutions – for example US oil consumption has already peaked in 2005 and declined until 2014, but since the oil price decrease in 2014/5, it is on the rise again and may yet surpass the 2005 peak (Dale and Fattouh, 2018). Predictions about the future of oil demand are uncertain, but the shift from peak oil supply to peak oil demand is a substantial paradigm shift from a world of scarcity, which is essentially a seller's market, to a world of abundance, which is a buyer's market.

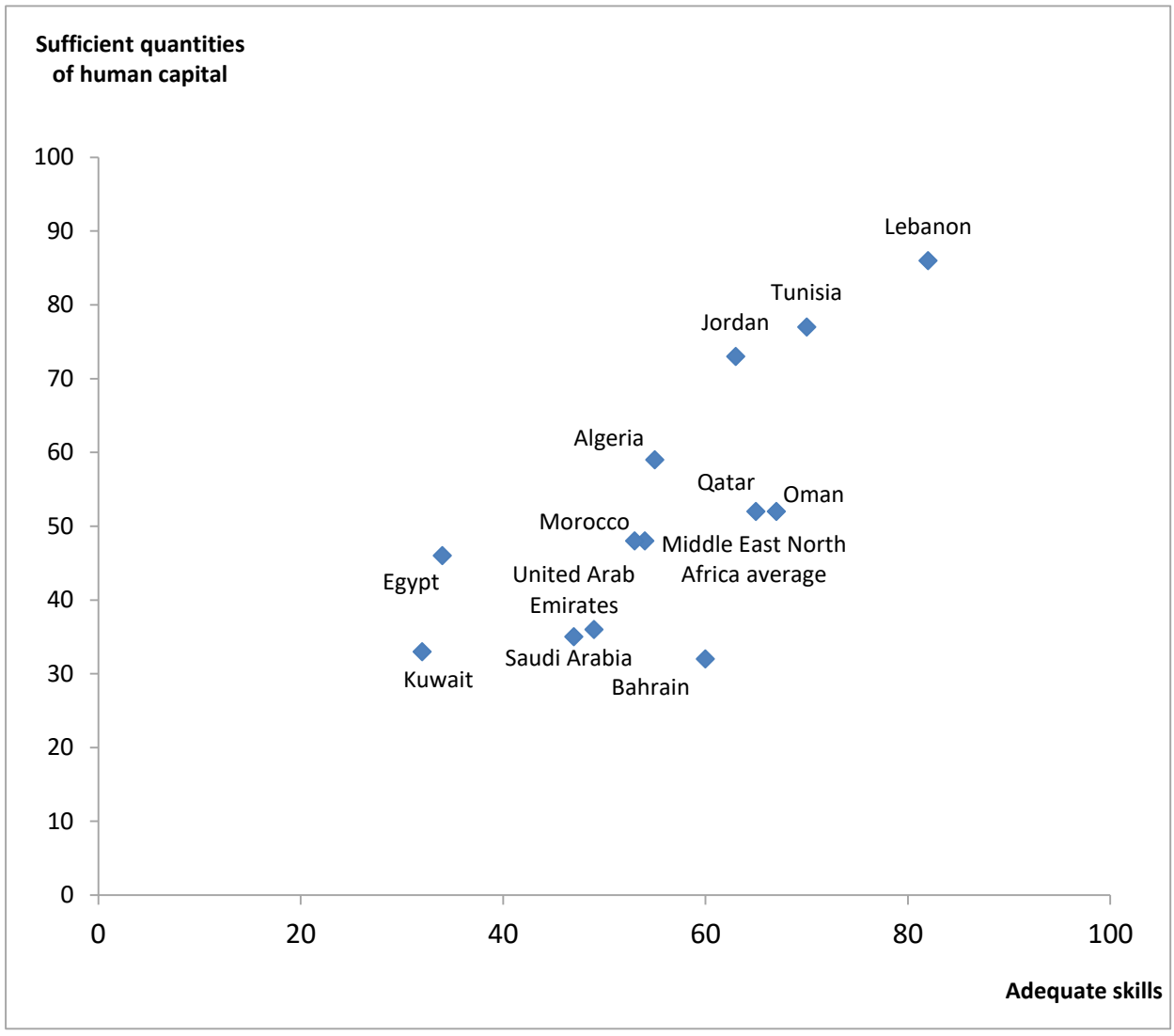
These prospects will thus urge Kuwait's leadership to accelerate the transition from a rentier economy towards a knowledge-based one, where value creation, the resolution of societal challenges and the well-being of society at large will be based on the production, diffusion and implementation of knowledge.

The skills dimension is particularly critical to achieve the transition to a knowledge-based society. The skills gap in Kuwait is particularly acute, and this represents a strong hurdle which Kuwait needs to overcome. In a 2008 survey, only 32% of the surveyed chief executive officers (CEOs) said that the education system provides people with adequate skills, and 33% said those skills were provided in sufficient quantity (Mohammed Bin Rashid Al Maktoum Foundation and Price Waterhouse Coopers, 2008). This is the lowest percentage within the entire Middle East and North Africa (MENA) region (Figure 5.1). Skills required by the CEOs were most importantly, communication skills, teamwork, analytical and critical skills, initiative, language skills, and innovative and creative thinking, while memorisation skills were considered as less important. On the other hand, curricula were considered to be based on theory rather than practical knowledge (for 71% of respondents in Kuwait).

As will be argued in Section 4.2, policy intervention in the domain of business innovation is justified by market failures. Such market failures are exacerbated in Kuwait due to the small size of firms as well as small markets which are insufficiently integrated into global value chains. These features make it less attractive for foreign capital to invest in innovative projects in the country. Skills gaps, combined with brain drain, also limit the creative forces which could drive innovation. In such an environment, it is crucial to achieve the right policy mix to raise awareness and create incentives for businesses to invest more in research, development and innovation.

Going forward, the growing imperative to tackle societal challenges calls for new types of policy intervention that are able to cope with failures that go far beyond those that characterise markets and structural systems (e.g. lack of investment in infrastructures or weak "static" capabilities in firms and administrations). Addressing societal challenges raises the issue of how to cope with various types of societal transformational system failures and what role governments should have in doing so (Weber and Rohracher, 2012). Although Kuwait has not set targets to reduce emissions as part of the Paris Agreement it signed in 2016, it has set an objective to diversify its energy production. By 2030, 15% of its total energy production should be generated from renewable sources, which will call for important technological and societal changes.

Figure 5.1. Skills gap in the Middle East and North Africa region



Note: This is a result of a survey of 587 Arab chief executive officers across 18 Arab countries and 12 industry sectors. Thirty-four Kuwaiti CEOs participated in the survey. MENA denotes the regional average of Middle East and North Africa.
Source: Mohammed Bin Rashid Al Maktoum Foundation and Price Waterhouse Coopers (2008), *Arab Human Capital Challenge: The Voice of CEOs*, https://www.pwc.com/m1/en/publications/abir/ahccenglishfeb172009.pdf.

5.2. Main characteristics of an efficient business innovation system

5.2.1. Research, development and innovation in businesses

The knowledge created through R&D performed by businesses, the public sector and foreign firms is a determinant of long-term productivity growth (Guellec and Van Pottelsberghe de la Potterie, 2004). Market mechanisms alone cannot ensure optimal levels of business investment in innovation. This is because innovation suffers from three market failures: 1) uncertainty (both technological and commercial), which is much higher than the risk taken in usual business situations; 2) indivisible upfront fixed costs (such as the cost of developing a prescription drug); and 3) the public good nature of innovation outputs, which makes it difficult for a firm to accrue the full benefit for itself.

Government spending on R&D is justified to overcome these market failures. It can also be justified through the high social rate of return. Social return to R&D is believed to exceed private returns by 50-100% or more (Mohnen, 2018). Innovation can also come from sources other than R&D; notably, non-technological innovation.

Science, technology and innovation (STI) policy spans the entire innovation value chain: from the creation of fundamental knowledge in basic research through applied research and technology, all the way to the provision of innovative products and services in the marketplace. While there is no natural and linear flow of knowledge and technology between these different stages, and innovation can occur with or without technological content, government policy action needs to support both public and private STI activities, and facilitate flows of knowledge between the different sectors.

Indeed, support for fundamental and applied research alone may lead to excellent scientific results, but there is no guarantee that the business actors will follow up on these results and take them to market due to the market failures mentioned above. The situation in Kuwait testifies to this, since the bulk of the support has gone to fundamental and applied research in the Kuwait Institute for Scientific Research (KISR) and Kuwait University, while R&D in business hasn't been supported by government.

5.2.2. High growth and innovative entrepreneurship

While there is a consensus about the need and justification for government intervention in favour of research, development and innovation in enterprises in order to overcome the market failures mentioned above, there is a debate over the approach to entrepreneurship vs. targeted small and medium-sized enterprise (SME) policy, as well as more general industrial policy.

Entrepreneurship policy is targeted at fostering new entrepreneurs to start their own businesses, whereas targeted SME policy helps existing SMEs grow and prosper. Support can be given in the form of financial support (grants, loans), or soft support such as training and business advisory services. Both types of policies can be justified, and also criticised.

For example, entrepreneurship policies can boost new firm creation, but such creation is not proven to increase wealth creation overall, notably due to the high failure rates. For example, an analysis of Global Entrepreneurship Monitor data on 37 countries shows that only high growth potential entrepreneurship is found to have a significant impact on economic growth (Wong, Ho and Autio, 2005). A meta-analysis also shows that entrepreneurial activity has a positive effect on growth in highly developed countries, but a negative effect in developing ones. It also concludes that developing countries need to attract multinational enterprises in order to stimulate the positive externalities on small firms (Sternberg and Wennekers, 2005). Indeed, policies incentivising entrepreneurship of any type will lead optimistic, but poorly resourced and skilled, people to start a venture and end up in a position more difficult than if they had continued to work as employees.

Selective SME policy can, on the other hand, focus government resources on a segment of companies with a likelihood of growth and job creation. Research shows that fast-growing firms have a direct and disproportionate impact on employment and competitiveness, with some 50% of the new jobs created coming from only 4% of the firms (OECD/IDRC, 2013). The effectiveness of such support programmes has been proven through, for example, the Small Business Innovation Research (SBIR) Program in the United States (see Box 5.1). Limitations of such programmes are within the ability to select the most promising projects without rejecting good ones – a staged approach to financing such as in the SBIR allows this, with a relatively loose selection in the first phase, and helping self-select in follow-up phases.

In addition to such direct support policies, there is evidently a need to improve framework conditions, in order to decrease the burden on enterprises linked to dealing with red tape. These framework conditions were discussed in Chapter 2.

Box 5.1. Small Business Innovation Research Program, United States

The Small Business Innovation Research (SBIR) Program was established in 1982, allocating subsidies from federal funds to engage small and medium-sized enterprises (SMEs) in federally funded R&D and increase private sector commercialisation of innovation derived from such funding (Figure 5.2).

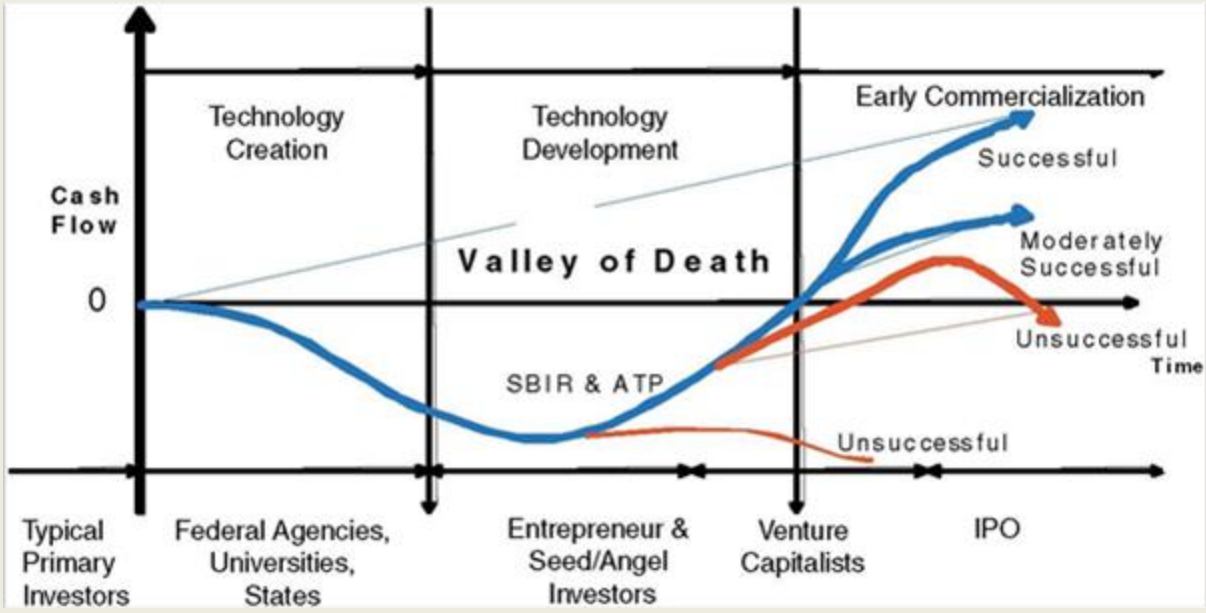
The SBIR has an annual average volume of USD 2.1 billion (2000-10) (over USD 43 billion cumulated from 1982-2015). It allocates over 4 000 awards each year and produces on average 10 patents per day.

SBIR awards can be seen as a "technological probe"; that is, a low-cost means for SMEs to explore the feasibility of their proposed product in a first phase, up to USD 150 000. Successful Phase I then can lead to Phase II financing of up to USD 1 million for R&D. Finally, if Phase II is, in turn, successful and comes up with a viable product, the company can apply for Phase III for commercialisation through follow-on R&D funding from the mainstream budgets of government agencies (not involving SBIR funding).

The phased approach enables the SBIR to create a genuine technological pipeline, funding a large number of projects in Phase I (with small amounts), supporting the promising ones through more substantial Phase II, and finally, ensuring commercialisation for the successful ones in Phase III. Projects are selected on technological merit as well as commercial potential.

The programme has been successful due to the scale and long-term stability of funding. It has thus been able to accelerate novel research, including high-risk R&D, low-cost exploration of opportunities (and dry holes). More broadly, the programme validates technology concepts and commercialisation potential, ultimately attracting additional investments by the private sector (angel, venture capital and large company investments). The SBIR also contributes to the commercialisation of new scientific findings made at universities. The success of the programme has inspired similar initiatives, notably in Japan, Korea, the Netherlands, Sweden, Chinese Taipei and the United Kingdom, and most recently Australia and Canada.

Figure 5.2. Positioning of the SBIR programme on the lifecycle from idea to market



Source: National Research Council Committee for Capitalizing on Science, Technology and Innovation (2008), "Introduction".

5.2.3. Knowledge diffusion and business-academia linkages

Knowledge in and of itself has little economic significance, it is its widespread adoption that unlocks productivity gains and growth. For example, the automobile was invented in 1885, but widespread adoption did not occur until the second half of the 20th century in most countries. Indeed, it is possible to correlate the lag in technology adoption with the lag in per capita income (Nobel, 2012). Innovative SMEs can become or remain competitive in the near term through technology adoption, adaptation and diffusion. Technology diffusion involves the dissemination of innovative technical information and know-how that is already in use in other firms, industries or countries.

Knowledge diffusion is a further key component, and occurs through various mechanisms, such as open publications, open data, international co-operation (such as in foreign direct investment, integration in global value chains and R&D collaborations), commercialisation of public research through spin-offs, and functioning of knowledge networks and markets (OECD, 2015b).

Diffusion is affected by the extent of trade integration in international value chains, foreign direct investment, the mobility of human capital, linkages between business and academia (including international linkages of academia which can facilitate technology transfer to the home country), the use of standards, the extent of business investment in R&D, skills, managerial capabilities, and other forms of knowledge-based capital, among others (OECD, 2017).

Hence a sound innovation ecosystem must have entities, such as technology commercialisation offices (OECD/World Bank, n.d.) or programmes, such as technology and manufacturing extension services (Box 5.2and Box 5.3), as well as various facilitator organisations, such as technology incubators, science parks, competence technology centres that serve to foster knowledge generation, technology transfer and diffusion, in addition to steering research towards industry needs. Commercialisation of inventions from

universities and research institutes; know-how transfer from global knowledge stock, as well as co-creation and co-invention play an important role in greater knowledge generation and moving the technology frontier of a country along with greater use of technology for economically productive purposes.

Box 5.2. Technology extension services

Small and medium-sized enterprises (SMEs) often do not have the capabilities or resources to perform cutting-edge research of their own. However, they can become or remain competitive in the near term through technology adoption, adaptation and diffusion. Technology diffusion involves the dissemination of innovative technical information and know-how that is already in use in other firms, industries or countries. Extension programmes are targeted efforts by government, technical institutes or industry leaders to remove information asymmetries and improve the sector's performance.

Technology extension services (TES) typically do not focus on the creation of new intellectual property and R&D, but rather support firms to catch up and move to the technology frontier, by providing an array of services including: training, advisory services and helplines, obtaining certification, and meeting standards, thus promoting the adoption of know-how in the industry. They also promote technology and knowledge diffusion through the adoption of standards and support in obtaining certification. Some TES include training on modern management practices.

Rigorous impact evaluations have shown that such training can yield substantial improvements in firm performance. In Mexico, a randomised control trial found that the consulting services provided to SMEs yielded an 80% increase in sales and a 120% increase in profits and productivity for treatment firms.

International experience suggests that the following principles should be adhered to when implementing a national technology extension service:

- The TES should be capable of providing guidance, service quality control and analysis of results of activities and services offered at regional and local levels. The TES should therefore be staffed with experts who are familiar with SMEs and the delivery of industrial extension services. It is likely that most academic researchers will not fit the purpose. Forcing academic researchers to be more relevant to industry by changing their incentives has failed in many countries. They can, and should, be part of the TES environment, but cannot be the core field engineers. The ideal candidates must have knowledge of technology and of the business environment of companies, as well as the ability to communicate in interpersonal relationships, since extension services are rendered by means of direct, face-to-face interaction with company leaders and employees.
- The desired impacts of the TES should be achieved by leveraging local and regional resources through wide participation of and collaboration with all sectors of industry.
- The TES should have the analytical capacity to study demand and monitor implementation and assessments at all levels.
- It should have sufficient administrative flexibility to link with the programmes of other agencies and integrate the technology extension programme into the broader (national) innovation policy framework.
- It should be demand-oriented and results-oriented in its entire operation.
- Evaluation of programme performance and its impact should be systematised.

Source: Shapira, P. et al. (2015), Institutions for Technology Diffusion, https://publications.iadb.org/publications/english/document/Institutions-for-Technology-Diffusion.pdf.

A vibrant innovation ecosystem also has policies and instruments such as matching grants, innovation vouchers and tax credits for R&D aimed at deepening university-industry collaboration and fostering greater innovation among businesses.

Box 5.3. The United Kingdom's Manufacturing Advisory Service

The Manufacturing Advisory Service (MAS) is an illustration of a successful extension programme. It provides technical information and specialist support to British small and medium-sized enterprise (SME) manufacturers through a network of nine regional centres. (Scotland and Wales operate similar, but independent, centres). The MAS helps English SME manufacturers increase their competitiveness by boosting productivity and efficiency through the adoption of best-practice manufacturing solutions, particularly around lean manufacturing. Eighty-five per cent of the MAS' work with English SME manufacturers focuses on lean principles. This includes lean on the shop floor, throughout the organisation, and throughout the value or supply chain.

The MAS offers five levels of support services to SMEs.

Level 1 is a free helpline inquiry service, through which manufacturing and business experts are available to answer questions on a range of technical issues.

Level 2 is a free, one-day, on-site manufacturing review whereby MAS manufacturing practitioners assess a firm's manufacturing operations and highlight opportunities to improve operational performance. Those Level 2 diagnostics often lead to additional services at higher levels.

Level 3 includes provision of general awareness training and networking events, including best-practice factory visits.

Level 4 is the MAS' capstone subsidised consultancy support, referred to as "workouts." During workouts, a MAS practitioner spends up to two weeks on-site with the SME instilling competitive manufacturing processes in the firm, including implementing lean manufacturing processes, co-developing value stream and process maps, teaching innovation methodologies, improving shop floor layouts and space utilisation, and introducing sustainable and energy-efficient manufacturing principles.

Level 5 includes referrals of SMEs' "non-manufacturing queries, such as financial, human resources, marketing, legal, or environmental issues," to other providers and programmes within the UK's suite of Solutions for Business. Indeed, the MAS' role is kept primarily to supporting manufacturing operations (and to a lesser extent teaching innovation methods); other programmes help these firms discover new markets, export globally, learn design principles or secure financing for R&D activity. In these cases, the MAS acts as a broker, serving as the central hub for connecting English SME manufacturers to the array of SME support services offered by the UK government.

Source: Ezell, S.J. and R.D. Atkinson (2011), International Benchmarking of Countries' Policies and Programs Supporting SME Manufacturers, https://www.itif.org/files/2011-sme-manufacturing-tech-programss-new.pdf.

Effectively transforming national R&D capabilities into an engine of innovation and growth not only requires an appropriate policy framework and research capacity, but also tools such as technology transfer offices (TTOs) and offices of contract research (OCR). Universities and research institutes are typically the

greatest generators of inventions, followed by innovative industries and businesses. In major universities with prolific research and innovation, activities related to steering intellectual assets towards industry and commercialising the research are typically located in the vice presidency of economic development of the university. The standard practice is for the vice presidency to have two offices – an OCR and a TTO. Both offices, though distinct, perform complementary activities and have strong co-ordination (Box 5.4). A good practice example of such a TTO is described in Box 5.5.

Box 5.4. Offices of contract research and technology transfer offices

Offices of contract research (OCR) provide resources that enhance research and other scholarly endeavours; catalyse relationships with government, industry and private foundations; ensure compliance with university and sponsor policy; and provide oversight of interdisciplinary research programmes, centres and institutes. The principal activities of the OCR are:

- Exploring funding opportunities: Investigating grant sources and various funding opportunities and resources for identifying opportunities that can be beneficial to university researchers.
- Intellectual property management: Helping researchers conducting industry sponsored research or research financed by governments or non-profits negotiate terms of intellectual property ownership.
- Preparing and submitting proposals: The OCR helps researchers in the various steps in developing a research project and preparing a research proposal for submission. The office helps: design and write about projects, build proposals, develop budgets, and advise researchers on the proposal review process in sponsored programmes.
- Award processing: After a sponsor has decided to fund a project, it needs to be reviewed, possibly negotiated and receive an authorised signature. The OCR manages and advises the researchers in the review and negotiation process.
- Material transfer agreements: The OCR is responsible for drafting the terms of the material transfer agreement and ensuring the intellectual property related to it is safeguarded.

A technology transfer office (TTO) is not merely a clearinghouse for the intellectual property generated by research, but rather a critical body that connects the conceivers, generators, adopters, disseminators and consumers of innovation, and effectively commercialises the outputs of research and innovation both nationally and internationally. In addition to their role in commercialising high-tech innovation, TTOs are also vital players in guiding academic research to areas of greatest social and industrial need. The university-industry relationship is a two-way street, and orienting research to the needs of the industry is important in converting the potential scientific value in real economic gains. TTOs also bring global knowledge (through industry relationships and conducting intellectual property analytics) to academic researchers who may be unaware of certain technologies due to severe information asymmetries.

A TTO provides essential commercialisation services to the inventors helping them monetise their research. It is responsible for all steps in the commercialisation of inventions arising from research from the university/institute. They key steps are: soliciting disclosures of inventions; screening (triaging of inventions); determining the commercialisation strategy (licensing/spin-off decision/contract research); executing the commercialisation strategy; monitoring and follow-up (management of royalties, etc.).

Box 5.5. The role of KU Leuven's research and development technology transfer office in the commercialisation of Tenofovir (HIV treatment)

For years, HIV-positive patients were required to take dozens of pills each day, with terrible side effects, for the rest of their lives. Now they have a better treatment option: a single pill, taken once a day. That pill includes a vital compound called Tenofovir, the product of collaboration between researchers at the Rega Institute for Medical Research (at KU Leuven), the Institute for Organic Chemistry and Biochemistry (IOCB) at Prague's Academy of Sciences, and Gilead Sciences. During the past decade, Tenofovir has emerged as a medical breakthrough for HIV, providing treatment that gives patients more life – in both quantity and quality.

When the first AIDS case was documented in 1981, it caught the attention of Jan Balzarini, PhD, who currently heads KU Leuven's virology laboratory. Balzarini has conducted research in KU Leuven's virology laboratory for more than three decades. During most of that time, he worked for the previous head of the lab, Erik De Clercq, M.D. To treat this mysterious virus, De Clercq and Balzarini tested a category of compounds called nucleoside analogues.

Tenofovir was initially licensed to Bristol-Meyers in the late 1980s, but the company lost interest in the compound after merging with Squibb Corp. in 1989 and subsequently returned the intellectual property to the IOCB and KU Leuven. One person at Bristol-Myers did not lose interest, however: John Martin, Ph.D., who went on to become chief executive officer of Gilead Sciences. While at Bristol-Myers, Martin served as a head chemist on the Tenofovir project.

After Martin left Bristol-Myers-Squibb to join California-based Gilead Sciences, he contacted De Clercq and Holý to see if Gilead could obtain the license to Tenofovir. The IOCB and KU Leuven licensed the technology to Gilead Sciences in 1991. KU Leuven's technology transfer office (TTO) facilitated the deal.

Gilead successfully developed a form of Tenofovir that could be taken orally and began selling it in 2001 under the brand name Viread. When used with other antiretroviral drugs, it helps keep the virus suppressed. Viread is now an active ingredient in three single-tablet HIV treatments sold by Gilead: Atripla, Complera and Stribild. Gilead also provides licenses for Tenofovir-based drugs to the Medicines Patent Pool, a United Nations-supported initiative to improve treatment access through patent sharing.

Viread's usefulness extends beyond HIV. In 2008, it received approval as a treatment for chronic hepatitis B virus infection, the most common serious liver infection in the world. "It is now one of the most prescribed treatments for that disease", says Bischofberger. In 2012, sales for Viread (the brand name for Tenofovir) reached about USD 845 million, and sales for Truvada, Atripla, Complera and Stribild (which contain Tenofovir) totalled about USD 8.14 billion. The financial success of those drugs may help fuel further breakthroughs from Balzarini and his colleagues, as Tenofovir licensing royalties come back to the universities and the virology lab.

The funding from licensing income provides a more efficient way to work, Balzarini says, as opposed to research grants, which can constrain researchers' ability to follow a hunch or a new development. Instead, the money from Tenofovir's licensing enables him and his team to pursue the unexpected: "If a new virus comes out tomorrow, we can, in a very dynamic way, more easily address emerging problems".

Source: KU Leuven (2013), The Importance of Technology Transfer, https://autm.net/about-tech-transfer/better-world-project/bwp-stories/tenofovir-disoproxil-fumarate

5.3. Structure of the business sector

5.3.1. Ownership structure: The industrial sector is dominated by large state-owned enterprises while non-oil manufacturing and services are largely private

In the period following the independence, Kuwait established state-owned enterprises (SOEs) as vehicles for implementing the welfare state, in particular in areas of natural monopolies, where a single-firm arrangement is seen as the most efficient arrangement, and where providing monopoly rents to a private entity would not seem appropriate. The nationalisation of the oil sector occurred in the 1970s and significantly reinforced the SOE sector. Stock market crashes in 1976-77, and another in 1982 drove further state share purchases in the banking, insurance and real estate sectors. At its peak in 1990, the state had shares in 61 of Kuwait's largest companies, accounting for 70% of the market capitalisation of the corporate sector. Following the Iraqi invasion and the resulting strain on the budget, a wave of divestitures followed in the 1990s, through auctions and initial public offerings (Sartawi, 2012[177]).

A major feature of the Kuwaiti economy is the extreme concentration of the value added in the state-owned enterprises, with 34 SOEs (0.08% of the total in the survey)[1] accounting for nearly 5% of employment and 56.4% of the value added. Specifically, it is the dominance of the state-owned industry sector which is visible not only within the industrial sector, but for the economy as a whole, as 15 establishments (0.04% of the total) account for nearly 54% of the overall gross value added. Within those, the four establishments within extraction and refining of crude petroleum represent the lion's share (53.2% of the total). The non-oil industry is dominated by the private sector; SOEs are found in the chemicals, rubber, and food and beverages sectors, but they produce only a fraction of the gross value added of the private sector and employ few people (Table 5.1).

Due notably to the weight of the oil sector and utilities,[2] the value added per employee is extremely high in the SOE sector, especially in industry (KWD 516 911/person on average, and in the oil extraction sector as high as KWD 931 150/person).

The share of services has been progressing in the Kuwaiti economy, increasing from 38.5% of the total value added in 2010 to 51.1% in 2016. The shift to services of the economy is a pattern observed in most OECD countries: after a protracted period of increase, the share of services has stabilised at about 75% of the economy, while in the resource-based Gulf Cooperation Council (GCC) countries, the share of services is still increasing, ranging from 47% in Qatar to 60% in Bahrain in 2016.

Within services, the private sector dominates, even though SOEs are present in strategic sectors such as finance, telecommunication, and air and sea transport. Kuwait Finance House and Zain (telecommunications) are Kuwaiti SOEs ranking among MENA's 100 largest listed companies (OECD, 2019a). Kuwait Airways and Kuwait Oil Tanker Company are also very significant and strategic state-owned companies.

Kuwait has a relatively thriving stock market, with 175 listed companies and a market capitalisation equivalent to 77% of gross domestic product (GDP) in 2018, one of the highest within the GCC, and indeed within the whole MENA region. A sizable proportion of trade (40%) takes place between retail investors. Nevertheless, the market capitalisation is strongly concentrated in the banking and financial sector (57% of the total), followed by the telecommunications sector (11%). Petrochemicals represent only 1% of the market capitalisation, while in Saudi Arabia it represents 25%. MSCI classifies Kuwait as a frontier market.

MSCI Inc.[3] used to classify Kuwait as a "frontier market",[4] alongside Bahrain and Jordan, while Qatar, Saudi Arabia and the United Arab Emirates were classified as emerging markets. Owing to the modernisation of the trading infrastructure, MSCI announced the upgrade of Kuwait to emerging market status as of June 2020 (Pacheco, 2019).

Table 5.1. Business structure as measured by the Survey of Establishments, 2016

		Industry		Services					
		Oil and petrochemicals	Industry, non-oil	Trade	Construction	Non-financial services	Financial services	Non-profit	TOTAL
Establishments	Public, units	4	11	4		8	5	2	34
	Public, % of total	0.01%	0.03%	0.01%	0.00%	0.02%	0.01%	0.00%	0.08%
	Private, units	5	5 516	23 592	1 494	9 974	447	123	41 151
	Private, % of total	0.01%	13.39%	57.28%	3.63%	24.22%	1.09%	0.30%	99.92%
Employees	Public, units	20 917	5 658	2 027	0	12 324	2 258	15	43 199
	Public, % of total	2.40%	0.65%	0.23%	0.00%	1.41%	0.26%	0.00%	4.95%
	Private, units	7 832	115 255	192 145	184 762	289 337	33 685	5 920	828 936
	Private, % of total	0.90%	13.22%	22.03%	21.19%	33.18%	3.86%	0.68%	95.05%
Gross value added	Public, million KWD	13 560	176	49	0	232	348	0.09	14 366
	Public, % of total	53.23%	0.69%	0.19%	0.00%	0.91%	1.37%	0.00%	56.39%
	Private, million KWD	128	1 350	1 596	987	3 881	3 134	34	11 111
	Private, % of total	0.50%	5.30%	6.26%	3.87%	15.24%	12.30%	0.13%	43.61%
Gross value added/employee	Public, KWD/person	648 306	31 159	24 108	x	18 830	154 148	5 933	332 554
	Private, KWD/person	16 365	11 716	8 306	5 342	13 415	93 036	5 711	13 404

Notes: The percentages are calculated on the basis of all enterprises surveyed, which does not necessarily represent the entire Kuwaiti economy. The enterprise census on which this survey is based has significant gaps, in particular for enterprises established since the last business census in 2008, and coverage of companies below 20 employees is sporadic. Thus, the total number underestimates the full population of establishments.
Source: Data from KCSB (n.d.).

5.3.2. The untapped potential of small and medium-sized enterprises

Worldwide, SMEs have proven to be a very efficient channel to accelerate the pace of economic and social development. Due to lower organisational and operational complexities, SMEs provide a fertile environment for training workers and developing their skills and help speed up the turnover of small amounts of invested funds. SMEs can provide valuable employment opportunities to a growing young population, improve productivity and help diversify the economy. They are also attractive because of the simplicity of their establishment and administrative structure, since usually only a relatively small amount of capital is needed for initial foundation and operation. In its most frequently chosen legal form, the limited liability allows them to exit the market with little significant impact.

SMEs account for 99% of firms in OECD countries, approximately 60% of employment and 40-60% of value added across these countries. Their share in GDP represents 49% in Austria, 42% in France, 49% in Japan, 57% in Spain and 45% in the United States (OECD, 2019b).

SMEs can also help economies and societies adapt to major transformations, such as digitalisation, globalisation, ageing and environmental pressures. The creation of new business ventures and innovation in existing SMEs are critical parts of today's innovation process, and should have a central place in government strategies to promote innovation. The 2018 OECD Ministerial Conference on SMEs, in its Declaration on Strengthening SMEs and Entrepreneurship for Productivity and Inclusive Growth, calls for "*governments to enhance SME participation in the national and global economy and enable SMEs to make the most of the digital transition. It underlines the importance of access to appropriate forms of finance; entrepreneurial opportunities for all segments of the population; entrepreneurship education and training and upskilling of entrepreneurs and workers; and multi-stakeholder dialogue on effective policies*".

Although productivity in SMEs tends to be lower than in large enterprises, they are the major engine of job creation and growth (OECD, 2019b).

The role of SMEs in the Kuwaiti economy has been modest, with large companies in the oil industry and the public sector being the leading contributors to GDP. Although statistical data on SMEs are lacking due to an absence of an official definition (Box 5.6), the World Bank estimates that the number of SMEs in Kuwait amounts to 94% of the total number of enterprises, but their overall contribution to the economy is marginal: just 3% of total GDP (Abukumail, Karam and Al-Otaibi, 2016). A similar result was obtained by a recent study by KISR, which concluded that micro, small and medium-sized enterprises (MSMEs) represent 95% of all enterprises, 8.6% of non-oil GDP and about 16% of total employment.[5] Moreover, the study concludes that MSMEs are stagnant, with an employment growth of just 0.5% per annum, and a real output growth of 1.1% per annum between 2003 and 2012. Only 150 MSMEs (less than 0.4% of the total number) provided any training (Ramadhan, Girgis and Al-Fulaij, 2018). Moreover, the objectives of the Kuwaitisation policy have also not been met, since the (very low) fraction of Kuwaitis employed within SMEs has further decreased, from 3.1% in 2003 to 2.5% in 2012.

Thus, the SME sector is currently not a significant contributor to achieving the Kuwaiti government's economic diversification objectives.

UNDP estimates indicate a relatively low SME concentration of one SME per 43 nationals as compared, for example, to Saudi Arabia, which has one SME per 25 nationals (UNDP, 2011).

Box 5.6. Definition of Small and medium-sized enterprises in Kuwait

In 2018, the government , adopted a new definition (Law 14/2018) for SMEs, according to which:

1. Small enterprises: are independent entities in which the number of employees does not exceed 50, assets are below KWD 250 000 and revenue generated is below KWD 750 000. If the enterprise is linked to another entity, the number of employees, assets and revenues of the combined entities need to meet the criteria above.
2. Medium enterprises: are independent entities in which the number of employees is between 51-150 employees, assets below KWD 500 000, and revenue generated is below KWD 1.5 million. If the enterprise is linked to another entity, the number of employees, assets and revenues of the combined entities need to meet the criteria above.

Previously the definition was quite different, and a small firm was defined as one with a start-up capital lower than KWD 25 000, with 1-4 Kuwaiti national employees, and a medium company as a company with KWD 25 000-500 000 in capital that employs 5-50 Kuwaiti nationals. This definition, created by the SMEs Law 98/2013, excluded 88% of small enterprises in the country that do not employ Kuwaitis and also defines firms with a large number of employees as small because they employ few Kuwaiti nationals. By contrast, Kuwaiti banks followed varying criteria in defining small and medium-sized enterprises (SMEs), using annual revenue or paid-up capital or a combination of the two indicators. The lack of a uniform definition made it difficult to accurately estimate the true contribution of SMEs to Kuwait's economy.

The adoption of a new uniform definition which does not depend on the nationality of workers is a step forward and will facilitate better understanding of the contribution of SME's to the Kuwaiti economy.

Sources: Ramadhan, M., M. Girgis and S. Al-Fulaij (2018), SMEs in Kuwait: Summary report - Small and medium enterprises in Kuwait: Their Impact and the Way Forward, https://www.kfas.org/media/1d025bcb-e3ea-4763-8b89-3b27c32680bd/EL8atw/StudiesResearchers/Files/Small%20and%20Medium%20Enterprises%20in%20Kuwait%20-%20Report%20Vol%20I.pdf; Al-Alawi, A.I. and F.M. Al-Ali (2015), "Factors affecting e-commerce adoption in SMEs in the GCC: An empirical study of Kuwait", http://dx.doi.org/10.3923/rjit.2015.1.21.

The Law on Commercial Companies stipulates that the majority of any business has to be owned by a Kuwaiti national (with the exception of free zones, or investments under the so-called 'KDIPA law' where 100% foreign ownership is permitted, but this does not apply to small and medium enterprises). This is clearly a significant barrier to enterprise creation for expatriates, who represent two-thirds of the resident population.

As regards Kuwaiti nationals, they need to forego lucrative employment in the government sector if they wish to start a company. The National Fund for SMEs can provide financing for such ventures, but only under specific rules, notably precluding equity ownership by non-Kuwaitis. This will be discussed in Section 4.6.2.

As discussed in Chapter 2, general business climate conditions are not favourable in Kuwait, and this poses a hurdle for SMEs in particular. In a World Bank survey on 502 SMEs completed in 2014, more than 35% noted that licensing, permits, labour regulation, regulatory uncertainty and corruption were the main hurdles and bottlenecks to the development of SMEs in Kuwait. About 24% of the surveyed companies also noted that they felt that the workforce was not sufficiently skilled. As noted in the survey, dealing with governmental regulations takes roughly 15% of a manager's time, leading to another roadblock in establishing a business (Abukumail, Karam and Al-Otaibi, 2016).

The start-up ecosystem

Entrepreneurs fuel economic growth, as new companies bring vitality to the economy through new ideas, products and processes, and fostering "creative destruction". As discussed in Chapter 2, incentives in favour of entrepreneurship are relatively weak, and framework conditions still unfavourable.

However, a young generation of Kuwaitis who has mostly been trained abroad is bringing new ideas and initiating a fledgling start-up ecosystem in Kuwait. Role models are Talabat and Carriage, two online services companies which have been quite successful. Their founders were able to exit their investments profitably through a sale to a foreign entity:

- Talabat is a food-ordering platform established in 2004, and sold to the German company Rocket Internet for USD 170 million in 2015 – the largest exit in the MENA region until then.
- Carriage is a food delivery company which started in Kuwait, and subsequently expanded to the United Arab Emirates, Bahrain, Qatar and most recently to Egypt. It was acquired by the German multinational Delivery Hero in 2018 for about USD 100 million (Hamid, 2019).

These success stories raised awareness among Kuwaitis that entrepreneurship was possible in Kuwait as well.

This triggered a wave of Internet-based start-ups launched and funded in 2017 and 2018, including: Jumla Club, a business-to-business food and beverage platform; Nalbes, a fashion retail site; COFE, a marketplace focused on coffee; InstaSalla, an e-grocery company; Tabeeby, a healthcare technology platform; and Ajar online, a fintech allowing tenants to pay rent online. COFE was the only Kuwait-based start-up listed as one of the "Top 50 Start-ups to Watch in the Arab World" by FORBES Middle East. Even more numerous are those in pre-seed stage, vying for initial financing, such as Li3ib, a sports facility management company; P5M, an app to find and select gyms; Scrrap.com, a platform for car parts; and many others.

There are few examples of entrepreneurship based on "hard" technology. One such example is Meshari oil remediation, which addresses a very specific environmental issue (Box 5.7).

Box 5.7. Meshari oil remediation

Dr Meshari Al-Mutairi's novel oily sand remediation technology was recently contracted by the Kuwait National Petroleum Company (KNPC) in a breakthrough project to treat a legacy problem. Dr Al-Mutairi has devoted his life to improving Kuwait's environment and was awarded 1st place out of 150 candidates at the 2018 Geneva International Exhibition of Inventions. The damage inflicted on Kuwait's environment from the destruction of the oil production infrastructure due to the Iraqi invasion motivated him to address the problem of oil sand remediation. Experiencing family members suffering from cancer likely contracted from extended exposure to the damaged ecosystem strengthened his resolve and he received his PhD from Portsmouth University and wrote his thesis on oil sand remediation. Dr. Al-Mutairi focused on the basic process of oil sand washing. Oil sand washing is a process practiced by many companies, but Dr. Al-Mutairi took the basic process and made several critical improvements to make it more efficient and economical. Dr. Al-Mutairi worked closely with the Sabah Al-Ahmad Centre for Giftedness and Creativity (SAC) to obtain patent protection for his innovation and he personally financed a pilot project with the KNPC. He applied his process on samples of contaminated soil and cleaned it to where it was certified by both the KNPC and the Kuwait Oil Company as compliant with both national and international standards for cleanliness.

It took Dr. Al-Mutairi three years of persistence to bring his technology to where it is now, ready for a commercial application. Dr. Al-Mutairi is working with the SACGC and the National Technology Enterprises Company and is on the brink of initiating a major project with the KNPC to remediate 64 000 tonnes of contaminated soil. The National Technology Enterprises Company will invest KWD 750 000 to support the capital expenditures for the project and will establish a joint venture in partnership with Dr Al-Mutairi to commercialise his technology throughout the Gulf Cooperation Council region. It is estimated that there is a market of several hundred million KWD in the region.

Source: Based on interviews with Dr Al-Mutairi.

Another promising area is medical technology, where a number of patents have been filed, and one has been commercialised through licensing. A group of medical doctor inventors has been mobilised by NASCO, a subsidiary of the National Technology Enterprises Company (NTEC), to create a Centre for Medical Innovation. Examples of inventions by those doctors include: a novel biodegradable balloon system used in kyphoplasty (spine surgery); an arterial internal guide needle deployment and suturing device, an innovative arterial puncture and closing device; sinus venosus atrial septal defect percutaneous treatment device enabling treatment of cardiac catheterisation without a surgical intervention. However, this initiative has not managed to rally support from the Ministry of Health.

The Berkeley Research Group published a report based on interviews with 35 Kuwaiti entrepreneurs located in Kuwait or in Dubai (Berkeley Research Group, 2017), identifying five archetypes according to present and future location:

- "Homebound for Now": 12 companies born in Kuwait and focused on operating in Kuwait for the time being. These companies mostly focus on the domestic market (9/12), and only 3 have regional (GCC) ambitions. They quote market opportunities, lifestyle and the "workforce support" supplement as key factors.
- "Looking Around": four companies born in Kuwait and considering relocating. They, too, mostly focus on the domestic market, yet discontent with the business environment, are looking elsewhere.

- “Springboard”: seven companies born in Kuwait that split operations to grow. These companies are mostly targeting GCC markets (5/7), while two target global markets. These companies value talent and government regulation more than the previous two categories.
- “Moving Out”: three companies born in Kuwait that relocated their headquarters. Similar to the previous category, they focus on the GCC and global markets, and value talent and government regulations above all.
- “Born Abroad”: nine companies founded by Kuwaitis outside of Kuwait. They also target the GCC and global markets, and care about markets, lifestyle, government regulation and talent.

The businesses located in Kuwait quote market opportunities and the “workforce support”[6] supplement as key supporting factors, while those who operate in Dubai quote access to regional markets, talent and the role of government as setting favourable conditions. Market opportunities score 4.6/10 for Kuwait and 7.7/10 for Dubai, while for talent Kuwait scores 3.8 and Dubai 7.3. The best Kuwaiti score is for access to finance, where Kuwait scores 6.2, still lagging Dubai at 7.3.

Interestingly, none of the entrepreneurs quoted technology and research as a decisive factor, and this dimension also scores the lowest of all dimensions (2.4 for Kuwait, 5.3 for Dubai). Similarly, intellectual property protection was not quoted as paramount, and scores very low (3.1 in Kuwait, 5.2 in Dubai).

There are a number of private sector incubator and accelerator programmes active in Kuwait, such as Reyada, Cubical, Niu, Sirdab Lab, Startup Q8 and Brilliant Lab. They typically offer co-working space, events (including networking events, boot camps and workshops), as well as mentorship services (help with business development, product-market fit, development plans and others). One of the most advanced programmes for entrepreneurs is that of Zain Great Ideas with Brilliant Lab (Box 5.8).

Entrepreneurs have a range of maturity stages – from the exploratory stage (pre-idea) through the planning stage (have an idea but need to understand customers’ needs), the building stage (have employees, looking for funding) and expansion (revenue stage, looking to grow).

Box 5.8. Zain Great Ideas

Zain is a leading Kuwaiti mobile and data services operator with a commercial footprint in 8 Middle East and North African countries with a workforce of over 7 000 providing a comprehensive range of mobile voice and data services to over 49.5 million active individual and business customers as of 31 December 2019.

Since 2010, Zain has been supporting youth entrepreneurs in Kuwait to accelerate development, incubate and connect with investors through the Zain Great Ideas programme.

1. 2010-2011, Zain Great Ideas focused mostly on supporting the creation of business plans.
2. 2012-2014, it expanded its services to include coaching, networking and international experience as well as support on project financing and investment pitch.
3. Since 2015, it has also provided expert support and advice in addition to support on project financing, approach to investors and investment pitch.

Thus far Zain has supported four cohorts – 2010 (ZGI 1), 2013 (ZGI 2), 2015 (ZGI 3) and 2017 (ZGI 4) and 2019 (ZGI 5). While in the first cohort, hardly 1% of applicants were tech firms, almost 100% of applicants in last two cohorts have been tech firms. Since inception of the programme, Zain Great Ideas has received more than 1 000 ideas. The 70+ awardees have received special corporate deals, in-kind services and hosting at Zain headquarters.

ZGI 5 had nearly 100 participants in the boot camp, which lasted 4 weeks from mentors including successful Kuwaiti entrepreneurs as well as academia from Stanford University and IE Business school. The 10 finalists went for an accelerator programme in San Francisco, United States, with Brilliant Lab, a Kuwaiti start-up acceleration service provider and Mind the Bridge, an innovation advisory firm based in Silicon Valley. They had the opportunity to visit Google and Microsoft, and get feedback on their business plans from Silicon Valley investors. Following the programme, the entrepreneurs still have access to consultations, mentoring and business contacts from Zain's team.

From the ZGI 4 programme, 8 out of 12 finalists are turning a profit, and were able to raise USD 1/5 million in additional capital. An average of 40% of all ZGI participants of the past four programmes are still up and running businesses to date. All applicants are tech companies, with a large number of marketplaces (28% in ZGI 4), e-sports (18%), as well as e-health, fintech, e-recruitment, e-logistics, e-food and cloud services. Success stories include **tktti**, an integrated online ticketing platform, **bookr**, a booking app for salons, spas and wellbeing, and **bleems**, a flowers and gifts order delivery app.

Zain has only become visible in the last two years and has never received any support from the government.

Source: Interviews with Zain management, (Zain, 2020).

Entrepreneurs that the review team interviewed were mostly young and educated in foreign countries. Their motivation is to "make history" rather than to make money, and some of them quit their well-paid government jobs to become entrepreneurs, in a quest of meaning of life.

The barriers quoted include bureaucratic hurdles to licensing (up to nine months to get a license), delays with customs clearance for imports and exports, dearth of talent (in particular software developers), and hurdles for foreign investors – even GCC nationals are not treated equal to Kuwaitis.

Interviews held by the review team with incubators in Kuwait confirm the findings of the Berkeley Research Group about entrepreneurs often starting up in Kuwait, then moving out, either to Dubai for market and regulation reasons, or to Egypt for reasons of costs and ease of hiring.

Overall, specific policies aimed at fostering entrepreneurship are non-existent, and overall entrepreneurial support ecosystem in Kuwait is weak. The National Fund for SMEs (Box 5.9) and the Industrial Bank of Kuwait (Box 5.10) are the two prime institutions financing SMEs. While the Industrial Bank of Kuwait mostly focuses on working capital[7] and is not restricted to SMEs or the private sector, the SME Fund was created specifically to provide seed capital to private start-ups. The role of the National Fund for SMEs will be further discussed in section 4.7. below.

Box 5.9. The National Fund for SME Development

The government established a National Fund for SME Development in 2013, as an independent public corporation with a capital of KWD 2 billion. Its objective is to help Kuwaiti entrepreneurs create small and medium-sized enterprises and increase their participation in the growth and development of the private sector.

At the outset, the National Fund was set to provide soft loans of up to KWD 250 000 to small (at least two Kuwaiti employees), and KWD 500 000 to medium-sized (five or more Kuwaiti employees) enterprises, with an interest rate of 2% and no collateral requirement. Submitted business plans are evaluated by four local banks and the internal evaluation team, backed up by an external technical committee and the board. A default rate of 80% is projected on the companies financed by the loans.

Relatively few loans were disbursed in the initial years, but since new management was brought in with private sector experience in 2017, operations have started running more smoothly, with a 40% approval rate of loans. A total of 400 projects have been funded to date. Companies funded are mostly from the commercial sector (40%), services (35%), industrial (17%) and handicrafts (5%). The fund has a three-month training programme, often attended by people who have been rejected for loans.

Equity instruments for early stage start-ups have been considered, but not yet implemented.

Source: Interviews with National Fund management.

Box 5.10. Industrial Bank of Kuwait

The Industrial Bank of Kuwait (IBK) was established in 1973 by the initiative of the government of Kuwait and the private sector. It is a specialised bank dedicated to supporting industry in Kuwait, providing medium- and long-term financing for the establishment, expansion and modernisation of industrial firms in the country. It also offers a full range of commercial banking facilities to meet the working capital needs of its industrial customers.

The IBK manages the Al-Senai (Industrial) Portfolio for Small Enterprises. The KWD 50 million funds for this portfolio were provided by the Kuwait Investment Authority under Law 10/1998 and the IBK manages it for them.

The fund supports entrepreneurs with Islamic financing for the purchase of equipment of up to KWD 500 000 (80% financed), but does not finance the working capital. Most entrepreneurs who approach the IBK Fund have ideas at a very early stage, and do not yet have a registered company. The IBK provides mentorship in addition to finance to these entrepreneurs. Most entrepreneurs are in the food business, but recently there has been an uptick in app developers. Entrepreneurs are expected to leave their daytime jobs if they have one, and the rules require that 100% of the shareholders must be Kuwaitis.

The IBK has a good track record, with 700 financed projects and a failure rate of just 10% over the life of the fund (20 years).

Source: Interviews with IBK management.

5.4. Innovation in the business sector

In order to understand the innovation performance of the Kuwaiti business sector, a dedicated innovation and R&D survey was conducted in Kuwait in 2018 (Box 5.11).

Overall, 43% of Kuwaiti companies confirm having innovated in either product, process, marketing or organisational structure in the three years from 2015 to 2017. The propensity to innovate strongly depends on size, as shown in Figure 5.3.

Partially or totally state-owned enterprises report a higher rate of innovation (respectively 61% and 53%) than privately owned ones (42%). This difference can partly be attributed to the size, since SOEs are large enterprises.

Conversely, when asked about the share of turnover from innovative products, SOEs report a smaller fraction (47%) than mixed ownership companies (62%) and private companies (61.5%). This would suggest that SOEs do have innovation activity, but that the market impact of it is less than in the private sector.

Box 5.11. Methodology of the dedicated innovation and R&D survey

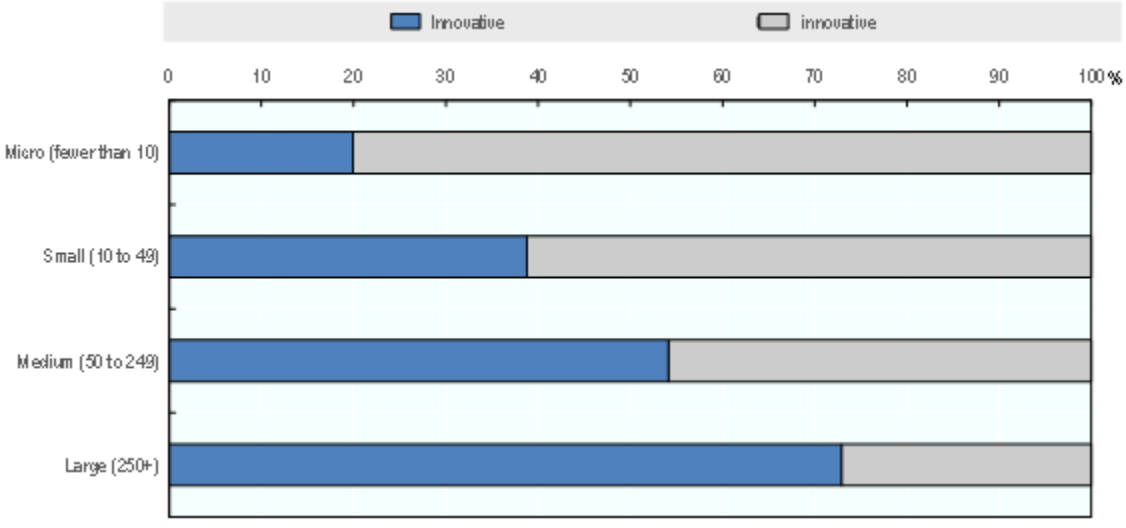
The innovation and R&D survey was carried out by the Kuwait Central Statistical Bureau (KCSB) and the Kuwait Foundation for the Advancement of Sciences in 2018 and 2019 (two campaigns), with methodological support from the GOPA consulting company, based on their expert experience with the surveys conducted by the UK Office for National Statistics and within the Gulf region. The innovation part of the questionnaire was based on the European Community Innovation Survey questionnaire using international guidance contained within the OECD *Oslo Manual* (OECD/Eurostat, 2005). The R&D part of the questionnaire was based on the 2015 OECD *Frascati Manual* (OECD, 2015a).

Sampling

Quality issues exist with the list of businesses held by the KCSB. As a consequence, all available companies in the KCSB directory with 20 or more employees were selected, amounting to 2 350 companies. This was complemented by a sample of companies with ten or more employees sampled from the database of 4 427 available companies in total. The target sample was 3 000 companies. A total of 2 154 companies provided valid responses. An additional sample of 200 companies were taken at random from 270 companies that were said to be less than ten years old provided by an independent provider – Cedar Rose. A total of 172 companies provided valid responses to this additional collection. The reference period for innovation and R&D behaviour was three years (2015-17).

Note: The OECD team was informed about a more limited innovation survey conducted by KISR and KDIPA on a sample of 397 enterprises covering five sectors. However, the results of this survey were not made available.

Figure 5.3. Innovativeness by company size, Kuwait



Note: The blue bar denotes the percentage of enterprises declaring having innovated in 2015-17.
Source: Kuwait Innovation Survey 2018/19.

Sectoral analysis shows strong innovation performance in the mining and quarrying sector (100% of a sample of three companies innovate). Significant R&D activity exists in Kuwait Petroleum Corporation (KPC) and its subsidiaries[8] (in particular, Kuwait Oil Company), based on co-operation with external

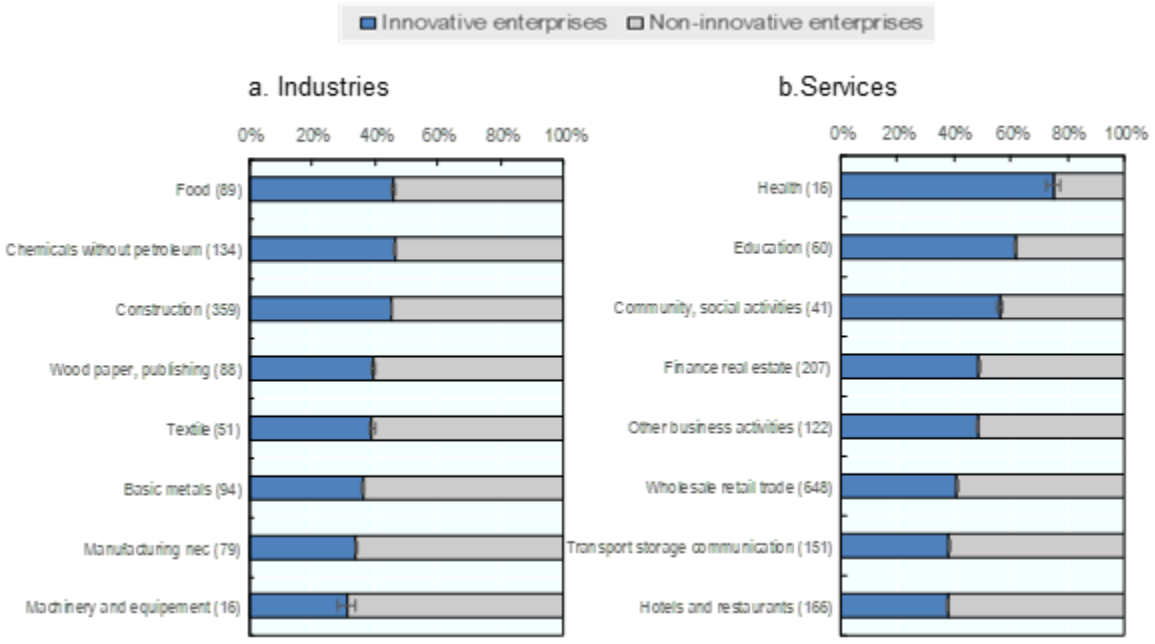
partners such as Schlumberger, as well as KISR (Box 5.12). The KPC is aiming to establish its own fully-fledged R&D centre by 2023. Other innovative sectors in industry include food, chemicals, utilities and construction, with more than 40% of innovative companies (Figure 5.4).

Among the services sectors, the most innovative is health (75% of a sample of 16), followed by education (62% of a sample of 60), as well as community and social (56% of a sample of 41).

Among other expenditures, the most common ones were the acquisition of machinery and equipment (35% of the businesses), design (18%), training (17%), and the acquisition of knowledge (10%).

Only 31 companies (representing 3.1% of the innovating companies) have received external financial support for innovation activities. Of these, 13 have been supported by KFAS, 9 by the Public Authority for Industry for customs exemptions and 4 from the Industrial Bank of Kuwait. Only one company mentioned the National Fund as a source of support.[9]

Figure 5.4. Innovation performance per sector in Kuwait



Notes: The left-hand graph represents sectors in industry, and the right-hand one-service sectors. The blue bar denotes the percentage of enterprises declaring having innovated between 2015 and 2017, per sector. The number in parenthesis next to the sector name represents the sample size in each sector.
Source: Kuwait Innovation Survey 2018/19.

Box 5.12. Research and development at Kuwait Petroleum Corporation

Kuwait Petroleum Corporation (KPC), founded in 1980, is the state-owned enterprise group in charge of oil exploration, refining and transport, as well as the transport of natural gas. KPC subsidiaries (also collectively known as "the K-companies") include Kuwait Oil Company (KOC), Kuwait National Petroleum Company (KNPC), Petrochemicals Industry Company (PIC) and Kuwait Oil Tanker Company (KOTC). Consolidated revenues reached KWD 24.9 billion (USD 81.7 billion) for fiscal year 2017/18.

The KPC is in the process of establishing the Kuwait International Petroleum Research Centre (KIPRC) as an internal R&D centre for K-companies, to be launched in 2023. This was originally planned as a strategic alliance with the Kuwait Institute for Scientific Research (KISR), but the negotiations failed, and therefore the KPC is establishing it as an internal R&D centre. Additional partnerships will be sought for the KIPRC.

The KPC's R&D Strategy focuses on developing in-house R&D1 in the upstream activities linked to:

- Steam flood technology for improved oil recovery and heavy oil production in co-operation with Chevron Saudi Arabia.
- Tight (low productivity) reservoirs simulation, which should help convert these stranded resources into producible reserves. For this, co-operation with Schlumberger, Baker Hughes and Halliburton is foreseen.
- Corrosion mitigation technologies to prevent pipeline degradation.
- Best practices in well delivery process, performance management, well engineering and operations.
- Production optimisation, including flow assurance and applying best practices of digital oilfields.
- Water management, including water control techniques, e.g. gels, permeability modifiers, inflow control devices and intelligent completions.

For downstream activities, it is planning a virtual R&D centre, and is developing collaboration with research institutes and universities. Their collaboration extends to universities abroad and includes Delft, Cambridge and Imperial College. Domestic co-operation includes KISR as a partner in downstream activities, including solar energy, for a 1.5 GW plant, in order to implement the Amir's vision of 15% renewable energy by 2030. However, the KPC believes that there is room for improvement for KISR due to a "brain drain" towards the KPC and its subsidiaries. The KPC also projects to sign a co-operation agreement with KFAS in order to facilitate access to international universities.

However, the main challenge for the KIPRC is the hunt for talents in order to ensure staffing. Originally planned to be staffed by 700 people, the number has been revised to 400. Kuwaitisation ratios pose an issue, because the KIPRC has to bring in foreign talent.

Kuwait Oil Company

The KOC is building on know-how it has acquired over the past, collaborating with international oil majors: British Petroleum and Shell are sharing best practices with the KOC, and the company also has a strategic partnership with Schlumberger as a key supplier (KWD 100 million contract).

The Research and Technology (R&T) Division of the KOC does not do mainstream R&D, but works with new and emerging technologies and technologies that need to be transferred into the KOC from external sources. The work is guided by a roadmap and search for solutions to the challenges identified

– 81 live projects today with a budget of approximately KWD 10 million per year. The KOC has partners who inform it about opportunities, visit key research and innovation centres around the world.

R&D started in the KOC in 2015 with about 50 people; in 2019 there were 150, ultimately to be transferred to the KIPRC. KOC R&D has several partnership agreements, including the above-mentioned contract with Schlumberger. Additional partnerships will be sought for the KIPRC.

Digitalisation is an area of focus, within a project called "KOC to D&I". A digital tracking system for the oil wells tracks operational problems. Another part is a digital reservoir model, as an intelligent decision support to enable better exploitation decisions, including enhanced oil recovery.

The KOC has in-licensed more than 300 software licences. It also develops its own software with a team of 30 developers. Some of that software is copyrighted (about 100 computer programmes). However, this software is not being licensed out, and the KOC does not see this as a business line. It also applies to "digital oilfields" which are for internal use only. The KOC won the 2013 ADIPEC award for the Best Gas & Oil Innovation for the Kuwait Intelligent Digital Field in Sabriyah.

The KOC started an employee innovation initiative in 2016, through the "Idea to Life" programme, which has the objective of capturing ideas within the KOC, evaluating them, and registering and implementing them within the KOC if relevant. The implementation of "Idea to Life" was to be implemented in 2018 as a pilot in the R&T Division, later to be rolled out across the KOC. An app is foreseen to enable online submissions; an award is also foreseen (one already exists for Hygiene, Security and Environment ideas within the KOC). A KPC committee is brainstorming with all K-companies on how to implement such initiatives.

Sources: Interviews; Kuwait Oil Company (n.d.), Upstream Centre of Excellence, https://www.kockw.com/CoE/Main.html.

However, due to the business demography, innovating enterprises are more numerous in wholesale and retail trade (26%), construction (16% together), and finance real estate (10%). Other sectors represented include education, food, wood and paper, chemicals, basic metals, textile, manufacturing n.e.c., machinery, and mining and petrochemicals (the latter sector has few very large corporations).

Innovation in the banking sector is strongly encouraged:

- In a circular sent to banks in October 2019, the Central Bank of Kuwait instructed all banks to prepare their 'shaping the future' strategies clearly specifying how do they intend to face the challenges (including technological developments ones), include how they will invest in better understanding of their customers expectations and needs during the next 3-5 years. It also asks the banks to establish a department concerned with fintech and innovation, in addition to a department for strategic planning.
- The Central Bank also created a sandbox which allows for fintech experimentation, as well as a Centre of Excellence to foster innovation within the Central Bank itself.
- The Institute of Banking Studies (IBS) encourages research (along with the CBK) by having a yearly award for best research paper with the "Kuwaiti Economic Researcher Award" and the "Kuwaiti Economic Student Award."

About 22% of innovating companies have developed goods innovations, and 41% have developed services innovations, while 32% have developed both goods and services innovations. Unsurprisingly, industrial sectors are more inclined to innovate in goods, while service sectors innovate in services. However, a large proportion of industrial companies are also innovating in services, as well as a number of firms in the services sectors innovating in goods (Figure 5.5).

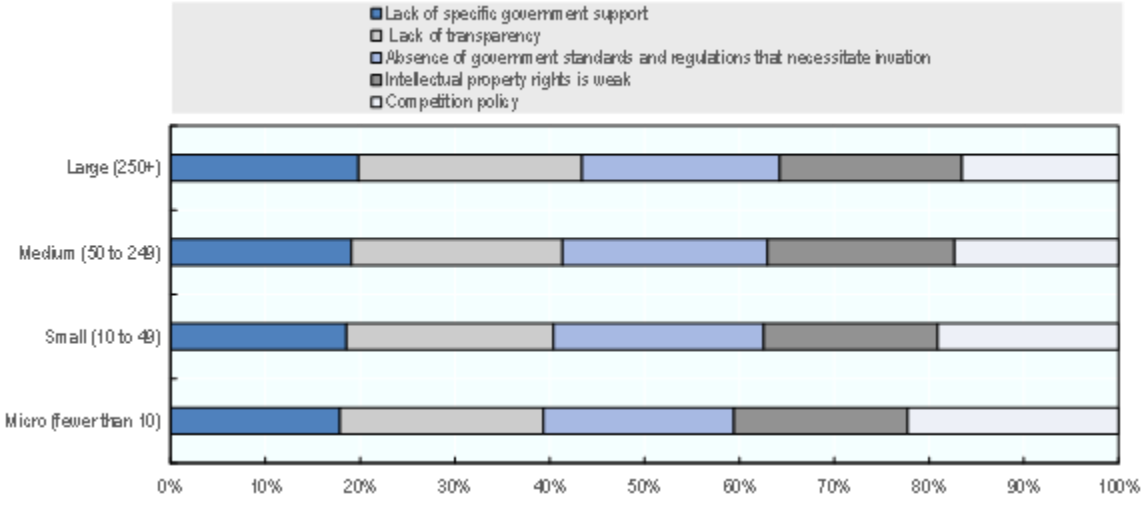
Companies which do not innovate report several reasons for not doing so, such as the lack of specific government support, the absence of government standards and regulations that necessitate innovation, lack of transparency, insufficient intellectual property protection, and competition policy (Figure 5.6). Interestingly, small companies seem to be more concerned about competition policy than large ones.

Overall, innovation activity in the business sector seems to be quite dynamic in Kuwait, with a significant proportion of innovating businesses, especially the medium and large ones. In the smaller companies, cost and knowledge factors are hampering innovation, and clearly there is very little support for innovation, since only 3% of innovating companies receive any kind of support for this activity.

Figure 5.5. Product innovation typology in Kuwait, per sector

Note: The left-hand graph describes product innovation typology in industrial sectors, while the right-hand graph describes service sectors.
Source: Kuwait Innovation Survey 2018/19.

Figure 5.6. Reasons not to invest in innovation, Kuwait



Source: Kuwait Innovation Survey 2018/19.

5.5. Research and development in enterprises

Research and development is less widespread than innovation, and only 17.6% of all enterprises report at least one R&D employee; this percentage varies from less than 8% for micro enterprises to nearly 36% for large enterprises (Table 5.2). On average, those companies that do have R&D employees have 5.8 R&D employees, ranging from less than 3 in micro enterprises to about 10 in large companies. Average spending on R&D per company is about KWD 46 000 (USD 150 000), ranging from KWD 4 400 (USD 15 000) in micro to KWD 115 500 (USD 380 000) in large companies.

Table 5.2. R&D in businesses, Kuwait

	Total enterprises	Number of enterprises with at least one R&D employee	Share of enterprises with at least one R&D employee	Average number of R&D employees (enterprises with at least one)	Average annual intramural spend, KWD[(1)]
Micro (0-9)	335	26	7.8%	2.8	4 400
Small (10-49)	1 149	151	13.1%	3.9	13 800
Medium (50-249)	611	149	24.4%	5.9	58 800
Large (>250)	229	82	35.8%	10.1	115 500
Total	2 324	408	17.6%	5.8	46 200

[(1)]Average spend is calculated by taking the average of the companies that report non-zero expenditure.
Source: Kuwait Innovation and R&D Survey.

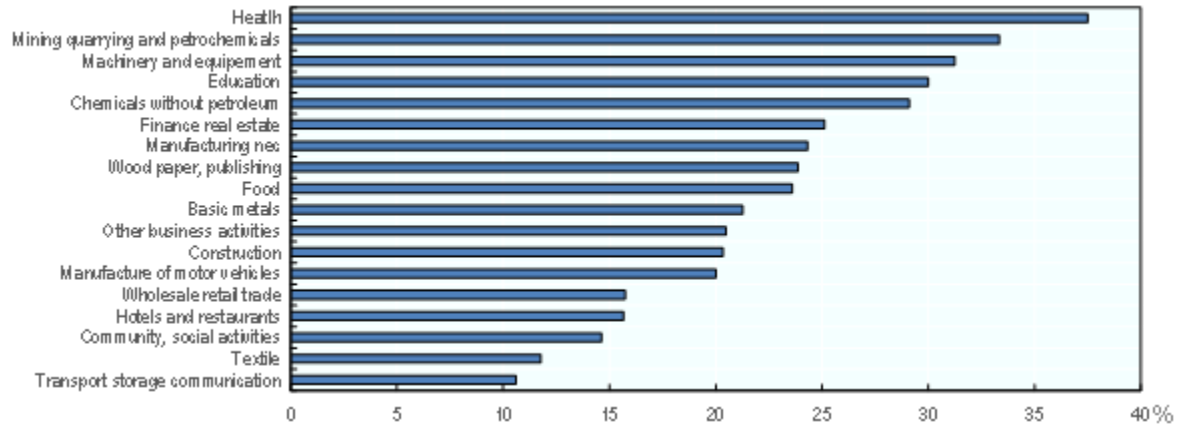
Large disparities are found according to sector (Figure 5.7). The sectors with the most R&D activity are health, followed by mining, quarrying and petrochemicals, machinery and equipment, education, and chemicals.

Even the large oil companies are still in the process of establishing R&D units capable of creating original research. Kuwait Petroleum Corporation is aiming to set up a fully-fledged R&D centre by 2023 (Box 5.12). The projected R&D centre with 400 staff would largely exceed all other R&D set-ups in Kuwaiti commercial entities.

The role of intellectual property is marginal. Only 15 companies (less than 1% of the total) reported a patent application.

A series of interviews and a focus group with Kuwaiti companies enabled us to better understand the R&D activity within companies. Many of the companies performing R&D are multinationals, and their Kuwaiti operations usually perform R&D which adapts the product or service to local standards and legislation. More elaborate R&D involving new product development is not commonly carried out in Kuwait. This is due to a combination of factors, including lack of skilled personnel (especially in the IT field), as well as risk aversion in the market itself: Kuwaiti regulators and consumers tend to prefer products which have been tested and proven in other markets before adopting them in Kuwait.

Figure 5.7. R&D in businesses, per sector, Kuwait



Note: Enterprises declaring intramural expenditure, at least one R&D staff or practicing R&D continuously.
Source: Kuwait Innovation and R&D Survey.

5.5.1. State-owned enterprises as contributors to innovation policy

In some countries, SOEs are used as motors for development and the creation of R&D capacity, for example via procurement and their participation in national development projects in key industries. They, however, generally suffer from a lack of innovation culture and capabilities and require specific actions to engage them in R&D activities. Malaysia is an interesting example of a country which strives to make its SOEs more innovative through dedicated communication and review of their capabilities (Box 5.13).

Box 5.13. Fostering innovation in state-owned enterprises

The role of state-owned enterprises (SOEs) in innovation has been studied mainly in Asian economies due to their expected, and sometimes effective, contribution to national economic development.

Several examples exist where SOEs have performed important roles either as innovative actors and/or innovation policy instruments. As innovative actors, they perform research and innovation activities like any other company, however sometimes with a longer strategic horizon and some more pronounced consideration for public goods due to their ownership structure. In the second role, specific linkages to SOEs allow the government to use them as drivers of innovation and, more generally, change agents. Governments can, for instance, directly fund and strategically steer large-scale R&D projects within these SOEs. They can leverage some of the specific features of SOEs, i.e. the capacity to perform R&D with longer time horizons, use procurement for innovation and other demand-based measures, and foster and nurture collaborative innovation and production networks. It was the case of Petrobras in Brazil which, benefiting from strong autonomy, somewhat took on the roles of ministry, regulator and innovation-oriented developmental agency. Since the 1980s, the company has gradually been creating its own domestic supplier networks of universities and other companies to develop new skills and technological solutions for the needs of the company The state authorities can also provide proactive customisation of educational, regulatory and procurement policies to support these SOE strategies and projects.

However, these two roles of SOEs in innovation activities should not be taken for granted. In several countries, governments keep using these companies as “cash cows”, notably in the oil sector. As argued by Tõnurist and Karo (2016), it also calls for high levels of policy co-ordination on the side of the government and the avoidance of short-termism.

In Malaysia (where they are named “government-linked companies”), despite a major privatisation programme launched in the early 1990s, SOEs still occupy a key position in the national economy, including in telecommunications, power generation and supply, ports, airports, highways, post, telecommunications, railways, and sewerage. The Malaysian government used SOEs to leverage its intervention in a wide range of priority industries (food, chemicals, iron, steel, petroleum transport, wood products, etc.), especially during the 1980s. For instance, PETRONAS, the national oil and gas company, financially supported several government mega-projects outside its core business, such as urban development, as well as industry and service endeavours such as the foundation of Proton, the national carmaker, which became one of the main domestic R&D performers. Proton employed 600 research engineers in its R&D centre in 2015.

However, as in several other Asian countries, the contribution of SOEs has been limited, beside special cases such as Proton, to some links with higher education institutions and to some initiatives in the financial (new Islamic financing products and services) and sustainable development areas (biomass projects). The government has therefore tried to foster innovation activities in SOEs, starting with an assessment of the largest Malaysian government-linked companies’ innovation capabilities undertaken in 2011. Beside the assessment dimension, this initiative was also a way for the government to promote the innovation mind-set and culture across Malaysian companies. The results of this survey showed that while coming close to best-practice level on certain dimensions, Malaysian government-linked companies were lagging behind the global benchmark on key innovation dimensions, such as the “importance of innovation” and “innovation as an integral part of business strategy”.

Sources: OECD Innovation Policy Review Malaysia (OECD, 2016a), Tõnurist, P. and E. Karo (2016), “State owned enterprises as instruments of innovation policy”, https://doi.org/10.1111/apce.12126.

In Kuwait, the state's major industrial holdings are in the KPC and its subsidiaries. These have significant R&D activities, but currently, most oil research is performed in KISR under the umbrella of a memorandum of understanding with the KPC. The bulk of the staff in the R&D department are managers, managing the linkages with KISR and other external (foreign) research partners (including the Q8 Research & Technology Centre, the KPC's research subsidiary located in the Netherlands). The R&T Department[10] remains confined to testing new technologies acquired externally. The KPC has prepared an ambitious plan for the creation of an International Petroleum Research Centre. However, this plan has already been significantly downsized (the budget has been reduced from KWD 500 million to KWD 100 million, with a significant portion reserved for the building) and is yet to be realised.

Kuwait also has a small number of state-owned companies outside the oil sector, for instance the Kuwait Flour Mill and Bakeries Company (under the Ministry of Commerce and Industry), as well as utilities and public transport companies. These may have some opportunities to increase absorptive capacity and innovation, providing exemplars for other companies.

5.6. Academia-business co-operation and linkages

Among the innovating companies, about 14% have co-operated with an external partner, most often a partner located in Kuwait, and the partner is (in decreasing order of frequency): an enterprise within the enterprise group, a supplier, a client from the private sector, a client from the public sector, a consultant, a competitor, an academic partner from university, or an academic from a public research institute. As far as foreign partners are concerned, they are most often suppliers from Europe or the People's Republic of China, an enterprise group enterprise in Europe or the GCC, or a client partner from the GCC. The most valued partners are suppliers (35%), enterprises from the same group (31%) and private sector clients (14%), followed by consultants (8%) and very rarely academic partners (4%). Collaboration with universities is very rare. Practitioners and observers cite the main reason as a lack of requisite expertise at Kuwaiti research institutes and universities.

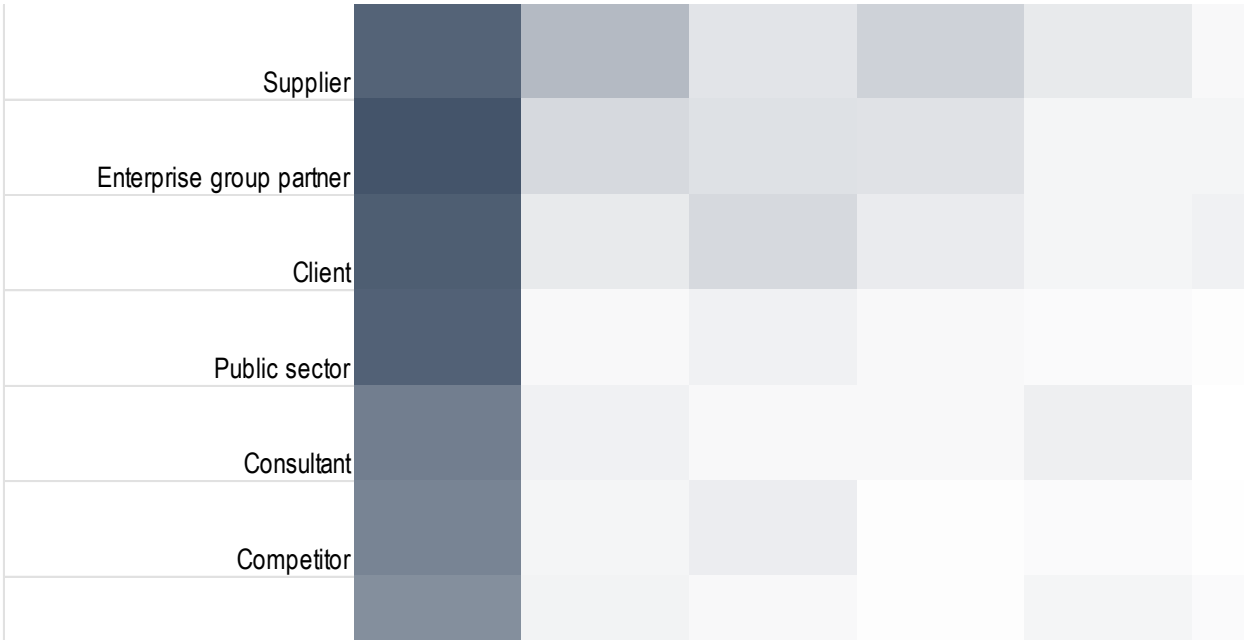
Collaboration on innovation activities as such is much lower, and only 140 (13.8% of the innovating companies) enterprises have actually co-operated on innovation activities. This percentage varies from 4% for micro companies, 9% for small companies, 18% for medium-sized ones and 22% for large companies. At the sector level, the highest propensity to co-operate is in food (24%) followed by education (22%), transport and storage (21%), finance and real estate (19%), and chemicals (18%).

Co-operation predominantly occurs within national borders (58% of all occurrences). International co-operation is fragmented, occurring preferentially with Europe, followed by GCC neighbours, Asia, and then the United States.

Co-operation also occurs along the full spectrum of potential partners, with an emphasis on co-operation with suppliers, enterprise group partners and clients, and the public sector. Co-operation with academia also occurs, but is more international in nature. Some international co-operation also occurs with enterprise group partners (Figure 5.8).

When asked about the most valuable type of co-operation, companies put forward co-operation with companies within the same group, and with suppliers, followed by co-operation with clients, the public sector and consultants.

Figure 5.8. Innovation co-operation by partner and location



Note: Darker colour indicates more companies reported co-operation (scale to the right). Multiple answers were possible by the same respondent. GvPPRI stands for government, public or private research institutes, while HEI stands for universities or other higher education institutions. GCC: Gulf Cooperation Council.
Source: KCSB Innovation Survey.

5.7. Policies in favour of business innovation

The objective of the Kuwaiti government is to boost the private sector and enhance entrepreneurship; in particular, to boost employment of Kuwaiti nationals in the private sector. It is also trying to stem the rapid increase of the wage bill in the government sector.

5.7.1. Entrepreneurship policy – the National Fund for SME Development

Kuwait has a legacy of SME support, starting in 1996 with the Kuwait Small Projects Development Company (KSPDC) set up by the Kuwait Investment Authority, with a fund of KWD 100 million for SME support. It provided loans with very high default rates of borrowers. By 2008, it switched to equity financing, for projects up to KWD 500 000. However, there were difficulties in identifying good projects to invest in. In addition, the overall impact was seen as contributing to job creation mostly for non-Kuwaitis, an outcome not deemed desirable. Indeed, by 2003, 819 jobs had been created, 761 of which were held by non-Kuwaitis (Ezell and Atkinson, 2011).

In 2013, the National Fund for SMEs was set up as the main policy vehicle to achieve that objective. It has been launched with a much larger scale than the KSPDC (capital of KWD 2 billion), with a clear focus on Kuwaiti employment (Box 5.9).

The National Fund is conceived as a “one-stop shop” for entrepreneurs, who should be able to get both finance and training to create successful ventures. The National Fund experienced some operational issues in its first years of operations and few loans were disbursed.

Overall, the initial design of the National Fund loans with a high projected default rate and no upside for the fund would suggest that entrepreneurial job creation would come at a very high projected cost to the government, which could be comparable to providing a government job.

Some of the regulations of the National Fund are difficult to accept for technology start-up firms with high-growth potential:

- The ban on equity ownership by non-Kuwaitis in companies sponsored by the National Fund. In the technology start-up sector, talented human capital can only be attracted through equity participation. Since very often such talents need to be attracted from outside, National Fund financing is seen as inappropriate.
- No second-round financing for successful entrepreneurs who wish to grow their enterprise is foreseen.
- An entrepreneur who fails once will not be supported again – there is no "second chance".
- Legal liability for entrepreneurs who cannot pay back.
- Lack of transparency in the selection process was reported by several entrepreneurs.

In addition, most technology entrepreneurs in Kuwait are non-Kuwaiti themselves, and therefore not eligible for National Fund financing. Such entrepreneurs can only count on very rare private funds such as Faith Capital, founded by successful technology entrepreneur Mohammad Jaffar, founder of Talabat, who created a venture fund with the proceeds of the sale of Talabat. Finally, the frequent changes in the National Fund structure and rules are a factor of instability.

The 2018 Law on the National Fund foresees equity investments in SMEs. The ambition of the new management of the National Fund is for it to be more than a funder: it is to become an enabler. It will provide mentoring, help with licensing, as well as working spaces, retail outlets in state-owned "co-op" supermarkets. It remains to be seen if this attempt will be more successful than the previous experience of the KSPDC.

An announcement was made in January 2019 about the creation of a USD 200 million technology fund for technology in Arab countries (Arab Times, 2019).

5.7.2. Policy support to existing businesses

Efforts in favour of existing companies are deployed essentially in two areas:

1. Regulatory simplification efforts focused on the improvement of the framework conditions, which have resulted in the improved ranking of Kuwait in the major indices such as World Bank's Doing Business and the World Economic Forum's Global Competitiveness Index.
2. Infrastructure provision, such as the creation of new industrial zones (see Box 5.14).

The regulatory efforts have been discussed at length in Chapter 2 and the OECD acknowledges progress that has been made.

Infrastructure projects are needed, in particular because of the specific issues with the provision of land, which is highly regulated in Kuwait. Land is provided by the Public Authority for Industry under very strict criteria, and in the form of leases. Provision of land is seen as one of the hurdles to doing business, since demand exceeds supply of fully serviced land. This is why projects such as the Shadadiya industrial area (see Box 5.14) are important. An alternative solution would be to allow companies to buy land and build their own utilities, but this solution is not allowed under present Kuwaiti regulations.

Box 5.14. Shadadiya industrial area

The Public Authority for Industry launched the construction of the Shadadiya industrial area, 500 hectares of industrial land to be equipped with infrastructure and support services to address the problem of limited availability of industrial land. The land will be divided into 1 036 industrial plots for food, chemical and other industrial activities, with different areas ranging from 1 000 m² to 10 000 m². It will be equipped with three industrial waste treatment plants, one waste treatment plant as well as a wastewater treatment plant in order to reuse water for irrigation purposes.

The objective is the development of non-oil industrial exports and diversify export structure. The Public Authority for Industry also hopes to attract national and foreign capital and expertise to establish industrial development projects.

Source: New Kuwait monitoring, Supreme Council for Planning and Development.

However, existing companies have very little direct support from the government. Out of 1 008 innovative enterprises surveyed in the Innovation Survey, only 31 mentioned receiving any support. Among those, very few cited government support per se, with only nine companies mentioning support from the Public Authority for Industry, mostly as customs exemptions.

In the absence of governmental instruments, KFAS is playing a role to support business innovation within its Innovation and Enterprise Directorate (see Box 5.15). This is important work, but the scale is clearly insufficient, since only about 20 companies are concerned in total.

The Industrial Bank of Kuwait provides loans for companies, and some companies have quoted this as support to innovation. However, those loans are exclusively for the purchase of physical assets (typically equipment), and cannot be used for working capital (see Box 5.10).

Box 5.15. The Kuwait Foundation for the Advancement of Sciences' Innovation and Enterprise Directorate

The Innovation and Enterprise Directorate (IED) works towards raising the private sector's awareness about the importance of innovation in business and provides incentives for R&D activities to improve products and services. It does so through three programmes:

- **Enterprise Knowledge Enhancement:** commission and disseminate macro level and sector level studies, which help understand the dynamics in the economy, and identify the barriers that hinder private sector development. Examples of studies include: i) the innovation landscape in Kuwait; ii) identifying priority sectors in Kuwait; cluster of innovation framework; development of the Kuwaiti private sector's S&T capabilities; SMEs in Kuwait: their impact and the way forward; assessment of private investment behaviour in Kuwait, iii) prospects of Fintech in Kuwait; iv) access to finance for SMEs.
- Enterprise Learning & Human Development: provide learning opportunities for human capital development on topics related to innovation, leadership, and new technologies through extensive training programmes for over 2 500 people annually (of which about 10% are trained abroad). The attendance fee is subsidised by KFAS but priority is given to companies that

annually contribute to KFAS budget. Macro-level and sector-level studies, which help understand the dynamics in the economy, and identify the barriers that hinder private sector development. Examples of studies include: the innovation landscape in Kuwait; priority sectors; prospects of Fintech in Kuwait; access to finance for small and medium-sized enterprises.

- **Enterprise Technological Development:** support and incentivize R&D in Kuwaiti companies by providing grants and exposure to international knowledge providers. KFAS provides a scheme for co-funding grants to incentivize 1) new idea feasibility; 2) implementation of R&D projects. In many cases the program gives informal technical advice and/or act as broker for knowledge providers locally and internationally. The program support an average of 10 projects per year (mostly feasibility studies), for an annual amount of USD 0.7-0.8 million (Figure 5.9).

One notable example of a possible role for this program is enabling R&D co-operation in the supply chain. An example of such efforts was the co-operation facilitated by the program among Kuwait Food Company known as "Americana", EQUATE Petrochemicals (a Kuwaiti polypropylene producer), and one of Fraunhofer Institutes as knowledge provider to enable EQUATE to develop and produce food wrapping material that meets Americana's desire to have smart food wrapping (capability to visually indicate rotting of cold cut meat products).

Figure 5.9. Co-funded R&D projects in private sector companies, Kuwait

Sources: KFAS (2018[193]), 2018 Achievements Dashboard, https://www.kfas.com/media/d4d79344-8dd2-4d54-a3b0-fb5b36abed8f/9Ff76g/Documents/2018%20Achievement%20EN.pdf ;Interviews with KFAS management.

5.7.3. Policies for technology transfer and diffusion

Technology absorption from abroad is the main tool which should enable Kuwait to move away from its dependence on income from natural resources over time. It is critical for Kuwait to maintain connections with international sources of knowledge and intellectual property policy should foster foreign direct investment and global collaborative research alliances that bring new know-how.

Strong collaboration between various intermediary organisations is the hallmark of a sound innovation ecosystem, and Kuwait could benefit from strengthening these intermediaries and exploring measures to foster greater co-operation among them. Most significantly, most of these entities do not seem demand-driven, and observers in general point to cumbersome procedures in these organisations that stifle innovation. Hence, the creation of a robust pipeline of inventions and strengthening linkages between the intermediaries should be a key priority for the government.

Currently, intellectual property creation and monetisation is supported by the Sabah Al-Ahmad Centre for Giftedness and Creativity (see Box 5.16), which provides monetary and non-monetary support for patenting and commercialisation. Intellectual property (IP) protection and monetisation efforts at other institutions such as KISR, KU, etc. are nascent, though their attempts to create IP programmes are a step in the right direction (see Box 5.17).

Box 5.16. Sabah Al-Ahmad Centre for Giftedness and Creativity

The Sabah Al-Ahmad Centre for Giftedness and Creativity (SAC) was established in 2010 and has made progress towards achieving its objective of building a safe haven for gifted and creative Kuwaitis by investing in their innovations and ensuring Kuwait's development on a global level. The SAC has been encouraging gifted students and youth by providing programmes which are tailored to nurture their creative potential and to provide them with opportunities in the domains of creativity and giftedness.

SAC has a mini Fablabs for prototyping and four Fablabs around the country which host entrepreneurs. The Fablabs facilities and machinery are in accordance with international standards, having been equipped with 3D printers, a laser cutter, a vinyl cutter and a Computer numerical control (CNC) milling machine, providing the resources and tools needed for investors to develop their prototypes. The use of the services provided in these Fablabs are free of charge, except for big firms, which must pay a fee. The prototyping lab has two engineers and three technicians. It also provides training and help with marketing research. To date, only two Fablabs are operational, the rest have been closed down.

SAC also supports entrepreneurs in their patenting activities, by subsidizing patent drafting services and submission to USPTO. In some cases, SAC also assists with prototyping and certification of the products.

In 2019 SAC reports:

- 7 inventions with commercialization potential
- 31 registered patents
- 4 inventions received marketing support by NF
- 24 developed prototypes in collaboration with various international firms.

Source: Interviews with SAC management.

Box 5.17. Technology transfer offices in Kuwait

Kuwait Institute for Scientific Research (KISR)

KISR established its technology transfer office (TTO) in 2017, but there is no dedicated budget. Thus far, the TTO has not commenced operations. While a skeletal staff of two was created, the TTO experiences high turnover because the staff is considered as a support unit, which is not as attractive for staff as a research unit, and does not count towards a promotion. Hence the unit only attracts fresh graduates without experience. There is no staff with business experience. Further hiring policies make it very difficult to hire expatriates because of the Kuwaitisation rules.

Kuwait University (KU)

The intellectual property (IP) office at Kuwait University has two divisions: one is research services that deals with contract research, the other is a TTO. The former includes two departments: one dealing with memoranda of understanding and the other with workshops, etc. The Vice President for Research signs all external contracts (memoranda of understanding, etc.). The Kuwait University bylaw drafted in 2005 governing the ownership and commercialisation of inventions arising out of university research was only recently (in late 2017) operationalised through the creation of the "patent office" (TTO). This intellectual property office was created in 2005. Until 2016, the role of the IP office was to register patents through a lawyer in the United States. Commercialisation was not its mandate. Kuwait University has its own bylaws because it is an independent entity, and hence, unlike KISR does not suffer from the same constraints to operationalise a well-functioning TTO.

Source: Interviews with KISR and KU management.

Technology transfer has been partly achieved in the oil sector where collaboration with BP, Shell, JPPC, Halliburton, Schlumberger, Baker Hughes and other international suppliers has brought foreign technology to Kuwait. However, this has mostly occurred through adoption of existing technology with minimal adaptation, and insufficient build-up of human capital in Kuwait (see Box 5.12).

Beyond the oil sector, some efforts have been made in this sense by NTEC (see Box 5.18), which was originally set up with the objective of investing in foreign technology firms and creating spill-overs in Kuwait. Through scouting local and regional markets, NTEC identifies market needs and potential business opportunities in both the private and the government sectors, then reacts via its various business models and the capabilities of its fully owned subsidiaries, to address such needs and opportunities in a manner that suffices its main objective to absorb technology into the Kuwaiti ecosystem.

NTEC experienced a challenging period following the resignation of its board in 2008 caused by the decision to reduce the paid-up capital by half. This caused a considerable slowdown in the period 2008-12. Since then, NTEC's capital has been increased again; however, the loss of institutional memory and disruption inevitably caused a slowdown.

Additional hurdles faced by NTEC include:

- public procurement rules which rely on the lowest cost to win the tender, making it difficult for innovative solutions to be adopted;
- profitability is a more important objective than technology transfer;
- interference of auditors in investment decisions (force exit when the stock market falls);

- Kuwaitisation rules –NTEC's initiatives to bring in foreign technology can be overturned by auditors (or parliament) who ask for a tender to give an opportunity to Kuwaiti companies to compete, even when there is clearly no domestic supplier of the technology.

Box 5.18. The National Technology Enterprises Company

The National Technology Enterprises Company (NTEC) was established in November 2002, gaining full support by the Kuwait Council of Ministers, and has been operational since late 2004 as a fully owned subsidiary of the Kuwaiti Investment Authority (KIA). Capitalised at KWD 100 million (USD 330 million), with a paid-up capital of KWD 85 million, NTEC was created to play a vital role in servicing major stakeholders in Kuwait with their technology needs.

The company holds a unique position, being fully owned by the Kuwaiti government, yet enjoys all private sector privileges and operates as such, with its own business license, articles of association, board of directors and capital. NTEC's business model was intended to be demand-driven and its investment strategies are aimed to address its core mandate: technology and knowledge transfer.[1]

NTEC's sector foci are: information and communications technologies, life sciences and healthcare technologies, energy, renewable energy, and water and environmental technologies.

NTEC has three core activities:

- NTEC's subsidiaries invest in the project's equity in partnership with the private sector and accommodate two types of technology projects: internally developed by NTEC's subsidiaries and externally developed by the private sector. In both cases, NTEC's subsidiaries favour a form of joint venture with technology providers, thus developing or scaling or customising (to Kuwaiti context) solutions with added value.
- International venture capital investments are NTEC's subsidiaries' core activities. The focus is pre-commercialisation stage companies that are viable and financially attractive with clear exit strategies and a vision to expand into new markets in Kuwait and the region. NTEC's subsidiaries invest in companies with products or services which solve existing customer problems with ground-breaking technologies and have the potential for above-average, substantial growth. Through many years of experience in venture capital investments, NTEC's subsidiaries' team has attempted to develop a systematic process based on a thorough selection process, comprehensive due diligence and active investment management. However, there is considerable bias towards more mature technologies and risk aversion leading to anaemic investments in truly early-stage technologies.
- To reduce the time gap of certain demanded technology introduction into mass markets along with building a true technology transfer platform, NTEC's subsidiaries invest in the form of private equity in technology companies (see Box 5.7) that have the potential for regional expansion, and a proven concept with a sustainable business model.

Since its inception, NTEC has expanded considerably, and its five subsidiaries are focused on different themes:

- National Advisory Services Company (NASCO), which focuses on providing best-in-class technology, strategy and management advisory services to both public and private sector institutions. NASCO also has a technology transfer office which operates in two ways: 1) scans research institutions in Kuwait for promising technologies. At Kuwait University and the Kuwait Institute for Scientific Research, it has identified 6-10 medical doctors who are really innovative, and 20 patents with good potential; 2) identifies foreign companies that want to do business in

Kuwait and explores whether their technological solutions have demand in Kuwait. For instance, it is working with Redwave energy (United States) that captures low-temperature waste heat (<200°) and converts it to energy and is in the process of setting up a pilot plant.

- EnerTech tackles technology projects and investment, with a special focus on the transfer of technologies from around the world to Kuwait and Gulf Cooperation Council countries.
- Kuwait Life Science Company (KLSC) operates similarly to EnerTech, but focuses on healthcare innovative concepts, seeking to provide access to emerging technologies from around the world to the public and private sectors in Kuwait. Established in 2010, the KLSC has a paid-up capital of KWD 15 million (~USD 53 million). It is fully owned by the National Technology Enterprises Company. Having a clear unmet need for healthcare innovative concepts and demanded services in the Middle East and North Africa region, the KLSC has been designed as an integrated healthcare company building unique projects, and is considered one of the pioneer venture capitalist and private equity companies in the Middle East that invests globally and operates regionally seeking to advance healthcare services and systems within the region. The KLSC supports both public and private sector stakeholders to access emerging technologies, establish unique projects and adapt best practices prevailing in today's healthcare field. It operates in healthcare investment, life sciences training, medical technology and pharmaceutical distribution.
- Impulse was established by the National Technology Enterprises Company (NTEC) in 2012 to take over the direct investment activities of NTEC in the Information and Communication Technology (ICT) field. Impulse is a unique venture capital company that transfers technology into the region through its investments. Impulse invests in high potential companies that are fully developed or at the forefront of developing, utilizing its investment tools such as Private Equity, Venture Capital and Direct Investment to lead both government and private sectors in the development and application of leading edge technology. Impulse has a robust and clear perspective on emerging technologies, combined with its deep understanding of the market changes which made it a valued ICT services provider for operators, governments and start-ups.
- Global Innovation Company for Software Development & Training W.L.L. (GIC) is one of the innovative human capital development solution providers. It is a fully owned subsidiary of National Technology Enterprises Company – NTEC - a mandate by the Kuwait Council of Ministers for technology & knowledge transfer, as a fully owned subsidiary of Kuwait Investment Authority - KIA. The company is committed to evolve regional HR practices and knowledgebase through simplifying and localizing leading global HR processes and practices, enable innovation and HR knowledge transfer through connecting HR practitioners, equip HR practitioners with the latest, most relevant and practical HR knowledgebase & skill set, educate HR as a core function of every manager. GIC focuses on building milestone strategies and goals with clients, accommodating International diversified solutions/services, skills and knowledge; and learning solutions covering areas of specialized technical training in Soft Skills, Human Resource, Project Management and Management Information Systems, innovative knowledge transfer techniques through our services and programs.

Source: Interviews with NTEC management, www.ntec.com.kw/#about.

The 2007 Blue Ribbon report called for NTEC to engage more deeply with KISR. NTEC did attempt to generate a more robust pipeline from KISR; however, these attempts had limited success due to numerous challenges at KISR including, but not limited to, restrictions of non-KISR researchers to access KISR's

resources, KISR's IP policies, impossibility to make secondment arrangements for KISR researchers with guaranteed return to KISR, etc. Deeper engagement between the two entities was called for in the Blue Ribbon report, but such deeper engagement has yet to materialise. There have been indications that NTEC has started collaborating with the SAC helping to scale up the SAC's inventions, but the OECD has been unable to get confirmation of this collaboration.

Attracting foreign investment with the objective of technology spill-over is also within the mandate of the Kuwait Development and Investment Promotion Agency. One result of these efforts is the establishment of the GE Knowledge Technology Centre (see Box 5.19).

Box 5.19. General Electric Knowledge Technology Centre

In 2017, General Electric (GE) established a Knowledge Technology Centre as part of GE Power Services. Through its collaboration with the Ministry of Electricity and Water, GE Power services today powers 37% of Kuwait's electricity by supplying its advanced gas turbines to six different power plants across the country. The centre, which counts 25 staff, has 3 main activities:

- training (in relation to GE technology, customers or internal GE employees): 900 people are trained each year;
- a tooling centre;
- an engineering centre (engineering, research innovation) which serves two goals: providing service for testing and R&D.

The centre has attempted to enter into a memorandum of understanding with Kuwait University and the Kuwait Institute of Scientific Research, but to date there has been no substantial collaboration. Certain students have been financed by the SME National Fund to obtain training from the centre. Overall, the centre, though a laudable initiative, appears to have very feeble links with the overall innovation ecosystem of Kuwait.

Sources: Interviews with General Electric Kuwait; General Electric (n.d.), GE in Kuwait, https://www.ge.com/menat/company/kuwait.

However, interviews with international technology companies revealed relatively limited appeal of Kuwait as a destination for the establishment of R&D facilities. Investments in Kuwait mostly concern sales and aftersales, as well as training facilities. The main barriers to R&D in Kuwait were quoted as:

- lack of qualified workforce for R&D locally, high labour costs and barriers to hiring expatriates;
- conservative culture – Kuwaiti legislators and consumers alike do not want to test innovations; rather, they prefer adopting products which have been proven and tested elsewhere;
- small size of the Kuwaiti market, and remaining barriers to do business within the GCC region, which does not function as a single market.

Intellectual property policies

Strong intellectual property protection positively influences a firm's propensity to invest in innovation (Allred and Park, 2007).

In the case of Kuwait, IP priorities could underpin the government's efforts in economic diversification and building technology-based entrepreneurship, human capital and digital skills. For instance, the WIPO

Performances and Phonograms Treaty (WPPT) and the WIPO Copyright Treaty (WCT)[11] set up a comprehensive copyright and related rights management and enforcement model system for the digital age, and encourages digital entrepreneurship that relies on creative content. Similarly, strong trade secrets legislation provides a trustful environment to invest and provide knowledge spill overs.

On the other hand, providing for safe harbours and patent exemptions for experimentation purposes might lead to attracting R&D spill overs and R&D centres in biotechnology and medical sciences. Such measures have been successful in many countries, such as in the United Kingdom. Moreover, the possibility of creating IP assets in emerging technologies of the Fourth Industrial Revolution (such as artificial intelligence, blockchain, 3D printing, the Internet of Things, augmented and virtual reality, Internet of Energy) should be explored.

Kuwait is a member of the World Intellectual Property Organization (WIPO) and the World Trade Organization (WTO), and also signatory of the WTO TRIPS Agreement, the Arab Convention for the Protection of Authors Rights, the Berne Convention for Protection of Literary and Arbitrary Works, and the TRIPS Agreement. According to the World Economic Forum's *Global Competitiveness Report 2019* (Schwab, 2019), Kuwait was ranked 71st out of 141 countries in terms of intellectual property protection, up from 80th in 2017/18, but still far behind the United Arab Emirates, ranked 19th, Qatar 23rd and Saudi Arabia 27th.

In May 2016, Kuwait's National Assembly passed the new Copyright and Related Rights Law. This law will help Kuwait accede to the WPPT. Kuwait has not acceded to either the WPPT or the WCT; however, it is in the process of drafting implementing regulations that have the opportunity to bring its regime in line with international standards and with the WPPT. The development of the creative industry in Kuwait will also benefit from strengthened copyright protection.

Patent protection in Kuwait used to work exclusively via the GCC Patent Office. Kuwait is one of the six member countries of the GCC, a regional organisation which also includes Bahrain, Oman, Qatar, Saudi Arabia and the United Arab Emirates. In April 2016, the Kuwaiti Ministry of Commerce and Industry started regulating patent protection in Kuwait via Law 115/2016, implementing the previously issued Patent Law (No. 71/2013) to approve and implement the regional GCC Patent Law declared in 1999. Since then, the Kuwait Patent Office stopped accepting applications, and instructed interested parties to seek protection through the GCC Patent Office in Riyadh, Saudi Arabia. However, in 2017, Kuwait reinstituted the national IP office for examining patents.

Kuwait joined the WIPO Patent Cooperation Treaty (PCT) in 2016, as the 149th member and the 6th and final GCC member state to accede to the PCT.

Nevertheless, few inventors choose the domestic patent followed by the PCT procedure, the overwhelming majority applies to the United States Patent and Trademark Office (USPTO), and a minority goes to the European Patent Office and the Japan Patent Office (JPO). One reason for this is the perceived prestige of having obtained a US patent, despite having meagre prospects for technology commercialisation and product/service placement in the United States.

Patents originated in Kuwait granted by the USPTO for the period of 2005-16 show that the highest number of patents issued by the USPTO is in the field of medical technology, followed by furniture, games, transport and civil engineering.

However, there is increased realisation that merely obtaining a patent is no guarantee of the commercial success of an invention and the SAC, which supports patenting efforts in the country, has created more rigorous standards for applicants to obtain support for their patenting endeavours.

The overall IP regime in Kuwait suffers from the lack of trained IP professionals skilled in IP management, valuation and monetisation. This could be improved by organising IP and technology transfer trainings and programmes that target these stakeholders specifically.

Kuwait does not have a separate statute that regulates the trade secrets law exclusively. Firms therefore use robust and strong contractual provisions as a strategy for protecting trade secrets. This is especially true of foreign firms wanting to protect their IP in Kuwait. However, the recent “Kuwaitisation” movement has made authorities reluctant to enforce strong IP provisions and contracts that protect the trade secrets of foreign firms. This has led to the inability to use robust contractual provisions (which was hitherto the practice) for IP protection. While hard data are unavailable, observers believe that this could impact knowledge transfer to Kuwait, as foreign firms may balk at sharing vital technologies if they have few mechanisms to protect IP. A strong trade secrets law could be instrumental in better IP protection and monetisation, as a lot of IP (especially process-related and business practice related) is not typically protected through patents or copyrights.

Kuwait took steps to strengthen its intellectual property laws by implementing the GCC-wide Trademark Law in December 2015. Trademark applications can be filed at the Kuwaiti Trademark Office, organised under the Ministry of Commerce and Industry.

Formulating an adequate national IP strategy and legal and regulatory framework is dependent on the technological growth trajectory of Kuwait and will underpin the projected diversification efforts. Public policies in the field of IP will need to be complemented with adequate policies in the field of technology law, labour law, higher education law, access to research results, data and instruments, awareness raising, training, and creating links between PRIs, HEIs and firms.

In addition to legislative reform for building an adequate IP system, other government policy instruments can be deployed as well, such as “codes of practice” or general guidelines on IP ownership and management. The Kuwaiti government attempted to adopt a new decree (No. 29 of 2016) for the establishment of the Kuwaiti Association for the Support of Inventors in order to provide support for Kuwaiti inventors to enable them to excel and develop more inventions and to increase the volume of Kuwaiti inventors within the innovation sector.

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Notes

[1] In reality, significantly less than that, since the survey does not cover small enterprises with less than ten employees.

[2] Traditionally very capital-intensive sectors with little labour.

[3] Formerly Morgan Stanley Capital International.

[4] Frontier markets are seen as more developed than the group of “least developed countries”, but considered too small, risky and illiquid to be classified as emerging markets.

[5] Excluding personal household employment, for international comparability purposes.

[6] A government subsidy paid to Kuwaiti nationals accepting employment in the private sector, as compensation for the wage differential between the public and private sectors.

[7] www.ibkuwt.com/export/sites/default/web/en/attachments/annual_report/Annual_Report_2016.pdf.

[8] Please note that these companies did not participate in the survey.

[9] This is not surprising, since the sample did not include micro companies, which are the typical the target of the National Fund.

[10] R&T is distinct from R&D.

[11] The WPP and the WCT are also known as the WIPO Internet treaties.