

# 1 Overall assessment and recommendations

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This chapter presents an overall assessment of Kuwait’s innovation system and policy, reflecting analytical findings of the review. It identifies the strengths and weaknesses of the national innovation system, and develops specific policy recommendations designed to facilitate Kuwait’s transition towards “Smart Kuwait”, a knowledge-driven society, which is the stated goal of the national development plan. Specific recommendations address the issues of governance of the overall innovation system, framework conditions for innovation, strengthening human resources, fostering critical mass and excellence in public research, intensifying diversification, fostering business innovation, and increasing and diversifying the sources of knowledge for enterprises.

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## 1.1. Overview

### **1.1.1. The transition to a knowledge-based society has now become an imperative for Kuwait...**

Originally a merchant economy at the tip of the Arabian Gulf, since 1938 and the discovery of oil, Kuwait has seen its economic and social development increasingly dependent on the extraction and exports of this commodity. Thanks to the oil rent, Kuwait has been able to ensure a high level of wealth and well-being for its population. This has also helped Kuwait recover relatively quickly from the Iraqi invasion in 1991 and continue its economic and demographic expansion.

However, while the oil rents are a source of wealth, they can also be a liability for Kuwait. The fall in oil prices in 2014-16 caused a fiscal deficit – the first one since the Iraqi invasion. This development has also lent credibility to a scenario of slowing global demand unravelling amid global concerns about carbon emissions coupled with the development of renewable energies and sustainable mobility, relying on alternative sources of energy. This is coupled with increased availability of oil, in particular driven by North American shale oil. These factors are likely to cause a stagnating, or even decreasing, demand for oil in the medium term. Such a development would transform the current paradigm of scarcity into one of an abundance of oil, transforming what has long been a seller's market into a buyer's one, with supply exceeding demand.

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

It is worthwhile noting that while Kuwait's fiscal sustainability will be challenged in the medium to long term, Kuwait enjoys a strong position when compared to its GCC neighbours. A recent IMF study shows that Kuwait still has a positive fiscal balance, and even though this is bound to worsen, there is significant accumulated wealth and no external government debt (IMF, 2020). Therefore there is still time to organise and finance this transition.

### **1.1.2. ...and in spite of historic foundations favourable to science and innovation...**

Historically, Kuwait presents a unique example of a bottom-up drive for education and knowledge. In 1936, before the discovery of oil, representatives of Kuwait's merchant class requested the Amir to develop a formal education system and volunteered to finance it from a new tax. In 1976, representatives of the private sector asked the Amir to develop scientific research, financed by a 5% tax on the profits of Kuwaiti-owned firms, giving rise to the Kuwait Foundation for the Advancement of Sciences (KFAS).

Kuwait's present-day Constitution of 1962 (reinstated in 1992) explicitly refers to scientific research in two of its articles:

- Article 14: The state shall supervise education, literature and the arts, and shall encourage scientific research.
- Article 36: Freedom of opinion and scientific research is guaranteed. Subject to the conditions and stipulations specified by law, every person shall have the right to express his opinion by speaking or writing or otherwise.

### **1.1.3. ...the transition is yet to commence**

Diversification of the economy has long been on the political agenda of the government and "New Kuwait", an ambitious 25-year national development plan, has been launched, with the goal of transforming Kuwait into a finance and trading hub, transitioning towards a knowledge-based economy<sup>1</sup> by 2035.

Nevertheless, little has been achieved towards the objective of reducing dependence on oil and UNCTAD data show that Kuwait's exports are as concentrated today as they were in 1995, contrary to its Gulf Cooperation Council (GCC) neighbours, who have significantly decreased their export concentration over the previous decades. Kuwait therefore appears today as the single most resource-dependent economy in the region.

The only diversification that has been initiated concerns chemicals, rubber and plastic products, which now represent 1.6% of gross domestic product (GDP) and 4.5% of exports in 2018. The sector has been the fastest-growing sector, with an annual compound growth of more than 15%, which increased nearly threefold between 2010 and 2017. However, the sector unfortunately has followed the same cycle as oil, as was experienced during the 2014-15 bust when it also suffered from the oil price decrease.

More notably, the high value-added sectors of trade and finance, which are the priority sectors specified by the "New Kuwait" vision, grew at an annual compound growth rate of 0.3% and 0.5% respectively between 2010 and 2017, much more slowly than either the oil (2.2%) or non-oil<sup>2</sup> (2.8%) sectors. Another large and fast-growing sector is public administration and defence, which grew at an annual compound rate of 5.9% between 2010 and 2017 and represented 10.6% of GDP in 2017.

Innovation performance has been below potential as suggested at the macro level by the falling trend in total factor productivity growth over the past 40 years. Publication statistics, as well as the number of patent applications and the share of high and medium-high R&D-intensive products in total Kuwaiti exports, also reveal poor innovation performance (see Box 1.1 for more details).

### Box 1.1. Kuwait's science, technology and innovation performance in figures

#### Innovation inputs

Based on a consolidation of data provided by Kuwaiti research actors, as well as an estimate of the dedicated innovation and R&D survey,<sup>1</sup> one could infer an overall figure for R&D expenditures in Kuwait of between KWD 120 million and KWD 135 million (0.33-0.37% of GDP,<sup>2</sup> see Table 2.3 in Chapter 2). This estimate should be taken with caution, as it depends on hypotheses (notably on universities' faculty engagement in research activities) and on the results of a first ever R&D survey in Kuwait. Providing a robust measure of gross domestic expenditure on R&D (GERD) would necessitate a stronger endeavour to collect, process and publish data according to recognised international standards with regards to statistics on research and experimental development (R&D) (OECD, 2015a) and innovation (OECD/Eurostat, 2019).

Government spending on education is relatively high, at around KWD 2.4 billion, equal to around 5.5% of Kuwait's GDP. However, Kuwait's performance in terms of education outputs has room for improvement, in particular in mathematics and sciences, enrolment in higher education (54.4% in 2018) as well as the performance of Kuwait's universities in international rankings.<sup>3</sup>

The labour force involved in research activities has grown strongly in Kuwait over the past 10-15 years. According to UNESCO data, there are about 3 000 full-time equivalent (FTE) R&D workers in Kuwait, but this number does not include R&D workers from private non-profit and business enterprise sectors. According to the KCSB survey, there are at least 1 100 FTE R&D workers reported by the companies surveyed. This is to be added to the UNESCO figure and is only the lower bound of the total R&D personnel in businesses, as the KCSB survey does not include all Kuwaiti businesses and in particular does not include large companies such as the Kuwait Petroleum Corporation. This R&D personnel figure is comparable to other Gulf Cooperation Council (GCC) countries, but well below most other resource-rich countries.

### Research and innovation outputs

The quantity of publications published by Kuwaiti universities and research institutes has been low in international comparison, at around 0.05% of world publications. While the percentage of Kuwaiti publications among the 10% most cited – an indicator of publication quality and research excellence – is higher than in most Latin American countries, Bahrain and Oman, at around 6% in 2018, it is much lower than for Qatar, Saudi Arabia, the United Arab Emirates and most OECD countries.

Kuwait also fares poorly in terms of international collaboration on scientific research, with only 58% of documents published being affiliated with more than one country address in 2018 – lower than for all other GCC countries.

Kuwait has filed more patent applications per million inhabitants to the US Patent and Trademark Office than Saudi Arabia and the United Arab Emirates, with 19.2 applications per million inhabitants on average in 2012-16. However, Kuwait's number of applications to the European Patent Office and the number of patents filed to at least two patent offices worldwide (IP5 families) are much lower, with 1.5 and 1.1 applications per million inhabitants respectively on average in 2012-16.

Kuwait's performance has room for improvement in terms of R&D-intensive exports compared with other resource-rich countries, with high and medium-high R&D-intensive products accounting for only 6.6% of its total exports. The average share of high and medium-high R&D-intensive products in total exports of Bahrain, Oman, Qatar and Saudi Arabia was more than twice that in Kuwait (13.7% in 2018).

1. Conducted by the Kuwait Central Statistical Bureau (KCSB), with support from the Kuwait Foundation for the Advancement of Sciences and the Supreme Council for Planning and Development.
2. Official statistics for R&D expenditure do not exist. Preliminary figure obtained by consolidation of data from Kuwaiti sources. Includes a very preliminary figure from the Kuwait National Petroleum Company, which is awaiting confirmation/revision.
3. For a benchmark of Kuwait's performance in university rankings, please refer to the section on higher education and research below.

## 1.2. The 2007 Blue Ribbon report, more than a decade later

Strategic reflection about the Kuwaiti innovation system was initiated by the report of the Kuwait Research Panel, also known as the Blue Ribbon report, in 2007 (Mahdy Al-Jazzaf, 2007). The report made clear recommendations as to how the national wealth could be used as a resource to spur knowledge creation and support productivity growth in order to bring well-being to society. The report provides a useful framework and baseline to assess progress accomplished since 2007.

### **1.2.1. Implementation of the recommendations of the Blue Ribbon report are below expectations**

The report, co-authored by Nobel laureate Ahmed Zewail, recommended raising R&D expenditure to 2% of GDP, as well as the establishment of a high-level governing body – the Kuwait Science, Technology and Innovation Council (KSTIC) – which was to co-ordinate the report's other recommendations, such as the restructuring of the Kuwait Institute of Scientific Research (KISR) and the creation of Kuwait centres of excellence in petroleum and petrochemicals, water, and renewable energy. The same report recommended repositioning KFAS into roles similar to those of the National Science Foundation (NSF) and the National Institutes of Health (NIH) in the United States, integrating public and private sector activities, supporting research faculty, funding research programmes, supporting technology commercialisation as well as pre-university education in science and mathematics.

Unfortunately, few of the recommendations have been implemented. In particular, the overall governance of the science, technology and innovation (STI) system has not been established. Not only has the KSTIC or an equivalent not yet been established, but there is also no governmental body (ministry or agency) with a mandate to support scientific research or innovation in the business sector. There is also no strategic document that states priorities for scientific research or for innovation in the business sector. Support for science, technology and innovation is thus mainly focused on supporting applied research at KISR, and, to a lesser degree, basic research at Kuwait University (KU). A complement is brought by privately funded knowledge institutions (KFAS centres, private universities), which have growing but still rather limited research activities. Funding for KISR and KU is negotiated directly with the Ministry of Finance and approved by parliament, without a formal scientific research strategy and vision, and the links to the “New Kuwait” development strategy are tenuous at best.

The KSTIC is still under discussion, presently downgraded to the status of a committee rather than a council. At the same time, no other governmental body has a clear mandate for STI (neither the Ministry of Higher Education nor the Ministry of Commerce and Industry have a specific mandate for STI). Therefore, such a committee would have to promote actively the national agenda for scientific research and business innovation, rather than just play a policy co-ordination and arbitrage role between ministries, as is the case in innovation advisory councils in most OECD countries.

KISR itself has been restructured and specific centres have been established for petroleum, water and renewable energy. Bureaucracy has been reduced somewhat. However, rules and regulations do not allow flexible response to market needs and commercialisation aspects and internationalisation are still weak. Strong barriers exist for sharing information across the organisation and with other institutions.

KFAS has also engaged in significant restructuring and streamlining of both its internal activities and those of its six centres in order to better fulfil its wide missions. Its centres still, however, draw significantly on its increasingly stretched resources – despite some progress in handing over some non-research related costs to public authorities – and KFAS remains far from having the resources and status to serve the functions of a full-fledged research and innovation agency or foundation.

As for the business sector, entrepreneurship support is offered through the National Fund for SMEs, which has been established with an endowment of KWD 2 billion (USD 6.5 billion). However, its focus is primarily on entrepreneurship, and somewhat on established SMEs, while large enterprises lack support for the diffusion of knowledge and the creation of value added in the economy.

### 1.3. The role of science, technology and innovation in the Kuwaiti society

#### 1.3.1. Science, technology and innovation have yet to become major enablers of “New Kuwait”

The Kuwaiti government launched a 25-year development plan in 2010, which states the government’s vision: “[To] transform Kuwait into a financial and trade centre, attractive to investors, where the private sector leads the economy, creating competition and promoting production efficiency, under the umbrella of enabling government institutions, which accentuates values, safeguards social identity, and achieves human resource development as well as balanced development, providing adequate infrastructure, advanced legislation and inspiring business environment.”

Rebranded as “New Kuwait” in 2014, the plan is further divided into five themes and seven pillars: 1) a reform of the administration in order to make it more transparent, effective and accountable; 2) stimulating competition and innovation in the private sector; 3) modernising infrastructure including ICT, transportation and electricity; 4) sustainable environmental policies; 5) development of the healthcare system; 6) education and human capital development; and 7) international positioning.

“New Kuwait” foresees privatisations of state-owned enterprises, making large infrastructure investments and the development of the private sector, notably through a USD 6.5 billion National Fund for SMEs. It is implemented through five-year mid-range development plans (MRDPs).

“New Kuwait” proceeds in phases and each five-year phase, corresponding to an MRDP, has a specific focus. While the focus of the previous MRDP (2015-19) was on legislative activities and infrastructure projects, the focus in 2020-25 is on private sector engagement and initiatives, while the development of a knowledge-based economy is pushed back to 2025-30 (Mahdi, n.d.). Given the long lead times in building up the appropriate systems and human capital for this transition, this timeline introduces the concept of a knowledge economy too late to achieve the objective of “Smart Kuwait” by 2035. The ongoing New Kuwait programme does contain a thematic area on the knowledge economy, which groups together a number of projects linked mostly to KISR’s activities. However, the link with an overall vision of the knowledge economy and society seems to be missing.

At this point it is important to note the two interlinked, but distinct, concepts of knowledge-based economy and knowledge based society:

- Powell and Snellman (2004) define a knowledge-based economy as “production and services based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advance, as well as rapid obsolescence. The key component of a knowledge economy is a greater reliance on intellectual capabilities than on physical inputs or natural resources”.
- A knowledge-based society is 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. It therefore has implications for society beyond solely economic aspects.

It is therefore essential to create an approach towards a knowledge-based economy and society, in order to warrant inclusiveness and well-being for all citizens and residents.

### **1.3.2. The current social contract does not provide sufficient incentives for innovation**

The prevailing social contract in Kuwait is that of a very generous welfare state, which not only provides security, infrastructure, education and healthcare, but also subsidised energy, staples and well-paid government jobs to its citizens. There are therefore limited incentives for Kuwaitis to engage in risky activities such as innovation and entrepreneurship. It also discourages nationals to work in the private sector, including positions in large corporations, which would be seen as very attractive in most OECD countries.

The “New Kuwait” Development Plan foresees a significant shift towards the private sector, mainly because the rising public wage bill is not sustainable in the long term. However, as long as the oil rent continues flowing, it will be difficult to cut back on what Kuwaitis see as their acquired rights. In particular, a government job is seen as a way to deliver the right of Kuwaiti citizens to their share of the oil rent.

One way out of this bind would be the separation of the “entitlement to the rent” from employment in a government entity (public administration or state-owned enterprise). To some extent, this is already in place with the “workforce support” supplement to Kuwaitis working in the private sector, but such support seems to be insufficient to incentivise widespread applications to private sector jobs. For entrepreneurs, the situation is even less favourable, and there is little incentive to forego risk-free employment in the government sector in order to start a business.

In parallel, a strong signal is needed from Kuwaiti leadership that could be interpreted as a moral encouragement in favour of entrepreneurship. The recent initiative of the Amiri Diwan<sup>3</sup> to establish a national innovation centre could play a decisive role in this sense, since it may be an indication to the population that innovation is a priority, and will be valued by the supreme leadership of the country.



Such a symbolic signal can appeal to the higher needs of the population, such as social esteem and self-actualisation. Kuwaitis do not need entrepreneurship to satisfy their basic livelihood needs such as physiological and safety needs – those are more than adequately filled by comfortable government jobs they can easily access (for the time being). A strong signal from leadership can create the perception that engagement in such activities will indeed increase their social status and self-actualisation goals.

## 1.4. Governance of the science, technology and innovation system

Governance is key to the way all organisations work, whether they be ministries, schools, companies or universities. There is no one best way to govern STI, since it is deeply embedded in each country's overall political system and heavily depends on its economic and social values; good practices in OECD countries cannot all be directly adapted to Gulf countries. However, some general principles that leave a great deal of freedom in their application can be used as a reference framework.

**Strategic orientation and co-ordination:** Originating from the highest level of the governance structure, but building on dialogue and consultation with a wide array of stakeholders, a clear mid- to long-term vision should inspire and guide higher education, research and innovation activities so that they contribute effectively to the type of economic and social development the country seeks. In turn, these broad strategic orientations should be embodied in strategic action plans, with an account of the measures and financial resources used to reach the strategic objectives with a defined timeframe and with ambitious – yet realistic – objectives. Since STI activities cut across many sectors and policy areas, the strategic framework should cover the policy objectives and interventions of various ministries and agencies in order to ensure their overall consistency towards common broad objectives. Specific institutions, such as high-level research and innovation councils, committees, interdepartmental platforms, and other formal or informal means of decision making and dialogue, are frequently used in countries to allow co-ordination within and across disciplinary, sectoral and policy silos.

**Strategic policy intelligence:** Governance is not a simple matter of top-down “steering” in which an all-knowing principal sets agents to work to achieve centrally generated goals. It involves competition, consensus-building, networking and negotiating decisions in arenas in which multiple actors are involved, based on clear and reliable data and evidence about what has worked or not in the past, current trends and what information supports the different socially desirable goals for the future. Strategies should therefore rely on strategic policy intelligence, i.e. the capacity to collectively produce, analyse and negotiate the information government needs to take “good” policy decisions. It entails statistical data, studies, and the results of policy monitoring and evaluation so that strategies and priority-setting initiatives, but also policy formulation and implementation, build on evidence and broad buy-in from stakeholders.

**Funding:** Sufficient and predictable financial resources and appropriate incentives for good performance and accountability are necessary to support the achievement of overall goals and priorities. Mid-term predictability of resource levels is a key precondition for those planning research and innovation activities. This is especially true for research activities where long time horizons and the accumulation of knowledge often make sustained investment key to achieve real progress. International experience shows that strategies without resources commensurate with their ambitions have only a limited influence. However, the different funding streams are not only a matter of providing sufficient resources for research and innovation activities, they are also steering mechanisms. They provide incentives to undertake these activities and make complementary investments in certain priority areas.

### 1.4.1. The Kuwaiti science, technology and innovation policy systems

The Kuwaiti innovation system has not yet established some of the key dedicated institutions that will help govern the transformation of the economy.

An “interactive chain” of interrelated institutions dedicated to STI activities at the different levels of the system – from strategic orientation and policy formulation to policy implementation – is missing. These institutions perform complementary functions considered essential in the research and innovation systems of various countries at different stages of development:

- A mechanism for high-level strategic advice and co-ordination, in which the research and innovation interventions of key ministries (notably their development projects as well as relevant procurements and regulations) should be embedded. Beside representatives of higher education and research institutions and civil society, the Ministry of Health, the Ministry of Oil, and the Ministry of Electricity and Water could be involved in this “strategy and co-ordination device”. In many countries, this takes the form of a specific high-level STI strategic council. As previously mentioned, this option has been proposed and defended in Kuwait at different moments in the past, but finally recently rejected for financial reasons.
- Ministries responsible for research and/or innovation policy making and co-ordination (whether inside or separate from the authorities in charge of higher education, and with a different scope) provide strategic guidance in co-operation with other parts of the system in many OECD countries. They are also often in charge of the negotiation and overall allocation of a distinct research and research-based innovation budget, allocated to agencies and directly to relevant institutions via institutional funding. In Kuwait, there is no dedicated ministry in charge of research and/or innovation.
- Agencies for higher education, research and/or innovation. Agencies come with very different scopes and types of autonomy and it is clear that the “western model” of agencies cannot be simply adopted in Kuwait without ensuring that their design is consistent with the characteristics of the national innovation system. However, some ministries in other policy fields in Kuwait have a dedicated agency (or an “authority”) implementing their policy and reporting to them. However, there is neither a research nor an innovation agency that funds and promotes basic and applied research and links it to innovation in industry, government and other parts of society. Elements of these functions already exist, but only in a fragmented manner in Kuwait (notably through KFAS and more recently through the National Fund). Interestingly, some countries have opted for an integrated research and innovation agency (e.g. UKRI in the United Kingdom) or at least a research agency with a wide scope from research to research-based innovation (e.g. the Research Council of Norway).

#### **1.4.2. Strategic orientation and co-ordination**

The provision of strategic plans has been instrumental in the economic development and catch-up of many countries in Asia, Latin America and Europe (e.g. the planning process in France, the prominent role of the Ministry of Economy, Trade and Industry in Japan and the Economic Planning Unit in Malaysia). However, to be useful guides for a wide range of actors on which the successful implementation of the plans depends, some key conditions should be met. Several of these conditions are missing in Kuwait.

*The strategic planning capacity at the General Secretariat of the Supreme Council for Planning and Development has improved and efforts to ensure the sustainability of this strengthened capacity are ongoing.*

The formal content of the Kuwait MRDP 2015-2020 marks an improvement compared with its predecessor – which had been criticised for the lack of clarity of its links between objectives and policies, its vaguely defined policies, missing key performance indicators (KPIs) and the low relevance of some projects. At least part of this improvement is due to co-operation with the United Nations Development Programme (UNDP) in several projects since 2011. The Kuwait Public Policy Centre (KPPC), established under one of these projects, is an important element of this strengthened capacity. However, the UNDP’s evaluation



for the establishment of the KPPC rated its sustainability as “moderately likely” and noted that many activities were unlikely to continue or may lose momentum after project completion (UNDP, 2018). This was considered particularly the case for evidence-based research, planning and monitoring, which lie at the core of the strategic planning process.<sup>4</sup> In response to these concerns, dedicated efforts to build the endogenous capacity by transferring knowledge and skills to the national staff are ongoing.

*The effects of national development plans on the extent and directions of STI activities of the different government bodies are unclear*

While it is always a difficult task to assess the influence of a strategic plan on concrete activities, investigations suggest that it is limited in the case of the MRDP. This is due notably to the mainly bottom-up process according to which projects are generated by ministries, the indirect link to potential additional resources and the lack of visibility of the plan.

First, the MRDPs provide only indirect incentives for the different government bodies to propose projects and initiatives that contribute to their achievement. Although the OECD Review team received different, and sometimes contradictory, information on this matter, it seems that there is no central budget for funding the plan’s projects, despite announcements of a total budget at the beginning of the period (KWD 34.15 billion, or over USD 112 billion). Projects are initiated by individual ministries based on broad strategic orientations and submitted to the Supreme Council for Planning and Development (SCPD) for inclusion under the plan, following a multi-step project approval process. The financial resources for funding the projects originate from the ministries’ budgets (and other project partners, if any), as negotiated with the Ministry of Finance, which reviews ministries’ budgetary requests, item by item. The incentive effect therefore mainly relies on the premise that the national priority “label” of these projects can be leveraged in the context of these negotiations with the Ministry of Finance.

Beside the provision of additional funding, a necessary condition for strategic plans to be impactful is that they have a high level of visibility and are clearly understandable by stakeholders. In Kuwait, the MRDPs and New Kuwait Development Plan were rarely referred to as important in the decisions taken by the numerous policy makers, heads of institutions and programme directors met by the Review team. Even more, these actors often seem to have little concrete knowledge of the content and process of the plans or, for instance, of the difference between the Kuwait MRDP and the New Kuwait Development Plan. This situation clearly contrasts with countries such as Kazakhstan or Malaysia, where national strategic plans appear as the strategic frameworks of reference for many public and private actors.

Finally, although the implementation of the plan has improved relative to its predecessor – as regards its execution rate at the minimum – there are some remaining weaknesses, as claimed in interviews and noted in the context of the evaluation of projects conducted with the UNDP.

*The concrete status and content of some of the projects falling under New Kuwait and mid-range strategic plans’ projects are unclear*

The Kuwait strategic framework is composed of the New Kuwait Development Plan to achieve the Vision 2035, implemented through the five-year MRDPs. New MRDP projects are selected and financed each year as part of the annual budgetary cycle, and monitored on the New Kuwait platform. Apart from the large infrastructure projects, it has proven difficult to trace back some of the projects listed in the strategic plans to concrete activities on the ground. There seems to be little knowledge of several of these projects among key STI actors, even at the highest level, and confusion as to what these projects entail and how they fit into the strategic agendas of organisations such as KU and KISR – the two *de facto* main implementation bodies for STI policy.

The overlap of two sets of projects – the one planned as part of the MRDP and those presented on the New Kuwait site – also creates some confusion. The overall logic of the linkages between the MRDP and

the New Kuwait Development Plan is clearly set out by the General Secretariat of the Supreme Council for Planning and Development (GSSCPD), but the connections between the projects falling under these respective plans remain difficult to understand – for the OECD Review team as well as for many of the stakeholders it met. A set of projects is announced at the launch of a new MRDP, which only partially corresponds to the projects on the ground (some of them not implemented but apparently presented in the MRDP as potential “examples of projects” during discussions) which, as explained above, are decided annually as part of the SCPD selection process, followed by budgetary approval from the Ministry of Finance.

*The STI investment and reform initiatives in the New Kuwait Development Plan are too little and planned too late to achieve Kuwait’s goal of becoming a knowledge economy by 2035*

As previously mentioned, the New Kuwait Development Plan relies on an incremental approach to achieve its Vision 2035. The priority during the current planning period 2015-20 is on infrastructure through several mega-projects and the next period will emphasise the privatisation of the economy. The knowledge economy will feature prominently in the strategic plan only from the period 2025-30 onward. Setting a strategic framework with two “nested” time horizons – mid-term five-year plans contributing to a long-term plan and vision up to 2035 – is a good practice, as it allows long-term strategic consistency, regular adjustments and a gradual approach. However, the priority on the knowledge-based development projects starting only in 2025 appears to come about very late (not least when compared to regional neighbours such as Saudi Arabia and the United Arab Emirates) and fails to take account of the long lead times required to build human capital. Building a competitive research and innovation capacity is an incremental and long-term process, subject to increasing returns (due, for instance, to critical mass effects and network externalities). Kuwait is already lagging a long way behind in the international research and innovation community. Waiting any longer would make it even more difficult for the country to find its position in this already crowded landscape.

*STI-related projects are relatively marginal in recent and current strategic plans, in both number and budget*

None of the MRDPs include research and/or innovation as one of their pillars or main objectives. The latest MRDP 2020-25 gathers most of the relevant objectives under the second theme “Foster a dynamic private sector”, which encompasses the objectives “Create an integrated ecosystem for technology, innovation, and knowledge”, “Expand the private sector’s role in SME incubation, funding and upscaling”, and “Develop new priority sectors for the economy”. It is too early to analyse the projects that will be initiated under this plan, but a review of the two last MRDPs (2010/11-2014/15 and 2015/16-2019/20) on the basis of available information shows that projects addressing STI-related issues remain relatively marginal and focused on research, following a rather linear view of the innovation process, based on the idea that innovation mainly proceeds from basic science, applied research and technology transfer.

This traditional approach justifies investments in projects that aim mainly to strengthen the research capacity and research support activities (in the KSIR, KU, Kuwait Petroleum Corporation [KPC], private universities, etc.), while innovation and the development of technological capabilities in companies do not feature prominently in any of these plans as a tool to promote the diversification of the economy beyond oil. While these projects are laudable, and while KSIR has expertise that will be instrumental in supporting private sector innovation capacity, it is not clear that such projects mark a clear change to the traditional science-push approach that still dominates in the Kuwait innovation system and has resulted in limited intellectual property and commercial innovation so far. A shift toward co-creation practices, where different innovation actors gather under a joint project to achieve a mutually beneficial outcome, would be beneficial to these large strategic projects.

This approach contrasts, for instance, with national strategic plans in Saudi Arabia, where many activities relate directly to strengthening manufacturing capacity and upgrading the innovation capabilities of firms, which often – as would be expected in Kuwait – do not draw on inputs from science, but from other firms' and experts' capabilities.

The plans make also little use of the procurement capacity of state-owned companies to support innovation, while it could represent an essential resource, in particular in this period where the private sector is still underdeveloped.

*There is no dedicated STI strategy to guide investments and activities of Kuwaiti research and innovation actors*

National development plans should feed into cascading strategies and action plans, from those covering the national STI system to those of specific institutions and operating units within them. In Kuwait, there is no dedicated strategic framework that would provide direction and guidance to the STI community. There is therefore a gap between the national development plans and those of specific institutions such as KISR and KU. Given the importance of KISR, it could be argued that its strategy (currently the 8th KISR Strategic Plan) spans the entire system. This argument is only partially valid, since KISR's strategy covers neither basic research nor higher education activities carried out by other institutions. More importantly, this strategy does not engage the different ministries and authorities whose funding, projects and procurement should form the backbone of such a national STI strategy. Finally, these strategies also have a less tangible role, but not less important, for "inspiring" actors of the system and creating a sense of a community acting towards common objectives. This is particularly the case of those strategies oriented towards clearly defined "missions" or "challenges" to be realised in a given timeframe, such as the new High-Tech Strategy in Germany, the Dutch mission-driven Top Sector policy or the United Kingdom's Industrial Strategy based on grand challenge missions.

Originating from the highest level of governance and developed in consultation with stakeholders, most OECD countries have a clear mid- to long-term strategy (or a combination of both: for example, a ten-year strategy revised every four years as in Norway or Spain). Thirty-three of 35 OECD countries recently surveyed were found to have national STI strategies or plans beyond specific research and/or industrial strategies (Borowiecki and Paunov, 2018).

*The monitoring of the strategic plans focuses on the execution of projects and relies on unclear key indicators*

The General Secretariat of the SCPD is legally required to make quarterly interim reports to the SCPD and to the Cabinet, as well as biannual comprehensive reports to the National Assembly regarding the performance of development projects and the current status of development plans.

Against this backdrop, the New Kuwait platform provides monitoring data for the general public, as well as more comprehensive information with restricted access. However, the data made available relate only to the operational execution of projects (financial disbursement and production of deliverables), without further information on what has been achieved. While it is understandable that the execution of projects is key, notably following the poor execution rate of the previous plan,<sup>5</sup> it is important to consider indicators related to results and impacts as well. Some key indicators are specified at the project level to monitor impact, but these remain vague and broad. This weakness had already been identified in the previous MRDP (Al-Mahmood, 2017). For instance, the three key indicators of the aforementioned project undertaken by KISR are: 1) extent of the value chain; 2) development of the production process; and 3) nature of the competitive advantage.<sup>6</sup> They hardly comply with the classic features expected from "SMART" KPIs, i.e. Specific, Measurable, Attainable, Relevant and Time-bound.

### 1.4.3. Science, technology and innovation policy formulation and funding

*In the absence of dedicated STI public authorities, government support to STI activities is bottom-up and led by the research supply side*

As described at the beginning of this chapter, there is no dedicated ministry in charge of research and/or innovation, nor research and/or innovation agencies. In other countries, these institutions not only develop and implement the relevant research and innovation policies; they also ensure the legitimacy of these policy fields and negotiate with central actors and the Ministry of Finance.

The absence of funding institutions in Kuwait that would lead research and innovation actors to contribute to socially desirable goals is compounded by limited absorptive capacity in business and government to “pull” research into areas of economic and social need. Hence, policy is *de facto* dominated by the supply side – in the first instance KISR. Despite efforts of the latter to integrate its clients and stakeholders in its strategic planning process, the overall approach at national level remains linear. This linear approach began to be abandoned 50 years ago among wealthy nations as the OECD developed the idea of science policy as a way to connect science to societal needs. In Kuwait today, there is little systemic thinking about the STI policy mix needed to encourage development across the whole system that takes proper account of present and future needs. There is an urgent need for an “arena” or “meeting place” to develop STI policy that involves a wide range of relevant stakeholders and is equipped with the data and strategic intelligence needed to reach decisions of national interest that are informed by evidence rather than the need to satisfy special interests, notably those of the research capacity already in place.

Given the importance of the public sector and the very low current innovation capabilities of the private sector, line ministries should spearhead the initiatives aiming to stimulate research and innovation via their procurement power. Despite the current budget restrictions, the amount of public procurement remains considerable. In addition to more funding, a reform of the procurement rules and a reorientation of the goods and services procured by the government would be an important step forward. Significant experience has been gathered in many countries on the strategic use of public procurement to boost innovation. This involves, for instance, setting regulations and supporting standards that require some firms to adapt their products, or in placing orders for the fulfilment of certain functions or needs above the current state of the art, which could be met within a reasonable period of time through a new or improved product. The latter proceeds, for instance, via the design of “functional” terms of reference that refer to a certain level of performance to be achieved by the purchased goods and services, rather than providing detailed specifications of these goods and services and prioritising price competition between bidders (Edquist et al., 2015). In Kuwait, as it has been instrumental in Malaysia (OECD, 2016), innovative procurements could include specific provisions to ensure that Kuwaiti companies also benefit and learn from these large and challenging projects (for instance using partnerships with foreign companies, local content requirement measures, knowledge/technology transfer arrangements, etc.).

*Despite repeated calls in previous reports and evaluations, there is still no STI policy nor high-level STI body to drive research and innovation policy in Kuwait*

Without high-level policy actors who have the needed awareness, expertise and/or mandate to support and endorse any significant proposals, past and current attempts from the KRRP, KISR or KFAS to develop a proper STI policy, with the relevant budget and dedicated institutions, have had only limited results when confronted with the budgetary priorities of the powerful Ministry of Finance.

The Blue Ribbon report’s proposal for the creation of a high-level STI body (the KSTIC) in charge of developing a proper STI policy was broadly in line with international experiences which suggest that effective councils – such as the Finnish one – involve the strongest government ministers, notably the Prime Minister, as members and need an effective secretariat and dedicated resources. The KSTIC was to be made up of key ministers and senior representatives of the research and business communities. Its

mandate was clearly to be an advisory council, without a policy implementation role. The KSTIC was never created, and it is questionable that a concept adapted to Finland would have worked in Kuwait. Indeed, the role of the Finnish Council is mainly to co-ordinate and arbitrate between the different ministries' strategies, policies and instruments, but those building blocks are lacking in Kuwait, so the need is to create policy making before it can be subject to co-ordination. Moreover, although advisory and strategic councils are common across the OECD (in place in 31 of 35 OECD countries surveyed at the time), some countries like Norway have found other ways to ensure STI interministerial co-ordination (OECD, 2017).

KISR has proposed to act as the leader of the proposed policy framework, as planned at the creation of the institute at the end of the 1960s. However, these efforts have faced strong resistance, since this role would conflict with its primary mission that involves being one of the main beneficiaries of the funds allocated. As a research institute, it is also regarded by some as lacking the high-level authority needed to have significant influence over the STI policy of various ministries.

In 2019, KFAS proposed the establishment of a "Higher National Research Committee". However, its proposed mandate mixes the functions of policy formulation and that of an agency (also named "funding council", hence the confusion in some instances). These functions involve very different tasks and therefore capabilities and level of legitimacy. Agencies are process-oriented and autonomous administrations whose main role is to allocate funds in a transparent and efficient way. In sharp contrast with these operational tasks, advisory councils/committees strive to exert their co-ordination authority over the responsibilities of specific ministries. A dual mandate involves conflicts of interest, as the advisory component might be tempted to provide the government with recommendations that best serve its plan, which most often involves, in the case of an autonomous organisation, its expansion in size and mandate.

Following long negotiations, leading to legal proposals, the different proposals were finally downgraded then discarded for budgetary reasons by the Ministry of Finance.

*The government's investment in STI activities is not consistent with its ambition to develop a diversified knowledge-based economy by 2035*

Overall spending on R&D is estimated at 0.33-0.37%<sup>7</sup> of GDP, a fifth of the 2% target set in the Blue Ribbon report in 2007, and only half of the spending realised in neighbouring Saudi Arabia and the United Arab Emirates.

Given the lack of public bodies dedicated specifically to supporting research and/or innovation activities, it is hardly surprising that the proportion of GDP that is dedicated to research and innovation activities is low by international standards. The two issues are of course tightly interlinked: without significant budgets for research and innovation, there is limited need for distinct ministerial authorities to steer and administer these limited resources or for a dedicated agency to allocate these funds; and without distinct STI institutions, the system lacks high-level promoters of research and innovation who can negotiate with central authorities and the Ministry of Finance and make the case for substantial STI budgets. The National Fund for SMEs has resources, which are an order of magnitude larger than those dedicated to STI, with a mission to stimulate entrepreneurship. However, successful entrepreneurship usually critically depends on innovation. Kuwait could therefore consider integrating those two policy areas to create larger impact on employment and the advancement of society in general. In order to support entrepreneurship and innovation in SMEs successfully, it is of paramount importance to strengthen their absorptive capacity, i.e. their ability to identify, assimilate, transform and use external knowledge on innovation practices. The Public Authority for Applied Education and Training (PAAET), the main provider of vocational education in its dedicated training institutes (in energy, telecommunications, etc.), could be very instrumental in providing such services.

*There is no direct mechanism for mobilising some of the financial surplus generated from oil extraction towards fostering the knowledge economy*

Some other resource-rich countries have established sectoral R&D obligations, under the classic rationale of underinvestment in research, reinforced by the fact that oil and gas resources are non-renewable. These countries save some of the proceeds of the exploitation of these resources and invest them in research in order to expand the range of future clean energy options. This can be done through specific regulations obliging firms to invest in R&D themselves or, failing that, to contribute to a common fund whose proceeds are then invested in research (the creation of KISR was the result of such “offset” from a Japanese company). Kazakhstan and Norway offer examples of this approach, using very different models from which Kuwait could draw lessons to find its own approach. Saudi Arabia also increasingly uses its sovereign wealth fund, the Public Investment Fund, to invest in innovation projects (electric vehicles, solar panels, autonomous vehicles, etc.).

In Kuwait, the sovereign fund (the General Reserve Fund) cannot be used for strengthening the research and innovation capacity and the Kuwait Investment Authority (KIA) has no specific mandate for using the funds to enhance the Kuwaiti knowledge economy, apart from the annual budgeting process. When investment in technological assets are made, these are chosen exclusively based on financial prospects. Exits can be done in the very short term (days) or long term (decades) depending on the evolution of their value. As for the Future Generation Fund, no investment can be made in companies within the Middle East and North Africa region. A positive sign was given when the KIA was asked to finance the National Fund for SMEs with the General Reserve Fund.

One contribution is through the KIA’s subsidiaries, with the National Technology Enterprises Company<sup>8</sup> in the first place. Its mandate is, however, limited to international technology transfer.

To some extent, KFAS’ levy is a form of innovation-related corporation tax, which largely relies on the oil economy. However, as previously mentioned, its budget is small relative to its portfolio of activities.

*The necessary increase of the STI budget will require significant reforms of the budgetary framework*

The Blue Ribbon report’s recommendation to raise the level of R&D expenditures to a minimum of 1% of GDP within five years (hence around 2012) and 2% of GDP within 10 years (i.e. by 2017) involved an increase in R&D expenditure by a factor of eight.<sup>9</sup> Although the Blue Ribbon Panel did not have a strong constituency able to bring influence to bear on the government, it had some effect since the 2010 Mid-Range Development Plan set the goal of achieving 1% of R&D intensity by 2013/14. However, this recommendation stood little chance of being achieved, as few developing countries exceed 1% of R&D intensity, with the bulk of national investment in R&D coming from the business sector. In developed countries, too, the bulk of national investment comes from the business sector, which is far from being the case in Kuwait, as confirmed by the R&D and Innovation Survey undertaken in the context of this Review. A rapid expansion of R&D spending is also very difficult to implement efficiently, due to the long lead times needed to build up the human capital necessary to spend these funds efficiently.

A significant increase in the government budget for R&D (and promoting private investment in R&D) would also require a change in the budgetary framework:

- The current *ad hoc* and very bottom-up process, whereby the budget is populated on a project/item basis, submitted by the different ministries and institutions (such as KU and KISR) to the Ministry of Finance cannot lead to a major and sustainable increase.
- The organisation that is currently the closest to being a research and innovation agency – KFAS – can only access funding from the government through competitive bids and is not entitled to any systematic institutional funding – which could fund a more public mission that could be allocated



to it. Moreover, its current “business model” based on a levy paid by affiliated companies is increasingly contentious.

- KU's and KISR's institutional funding is allocated on a yearly basis and has fluctuated significantly, undermining necessary mid- and long-term planning and investment. It has also become increasingly subject to administrative burdens and rigidities that hinder research activities. Moreover, it is provided as a top-up to external funds acquired by these organisations, so that any increase in external funding is counteracted by an equivalent decrease in institutional funding. Not only is this practice a major disincentive for winning external funding, but also it reveals a purely financial, rather than strategic, perspective underpinning research funding.

#### **1.4.4. Science, technology and innovation policy implementation**

*State-owned companies do not play a significant role in research and innovation*

The government has limited leverage over business R&D via the state-owned enterprises (SOEs) – there are not many of them and they focus on low R&D-intensity sectors. The government's main opportunity to use the SOEs to promote innovation, then, is via the KPC. As with equivalent companies in resource-based emerging economies (e.g. the PDVSA in Venezuela and Petrobras in Brazil), it is something of an “island”, with R&D strongly connected to multinational technology providers and oil companies, but with little R&D inside Kuwait. Ambitious plans to develop research capacity in the oil companies have been cut drastically, which tends to indicate their low level of priority in the overall strategic plans of these companies.

While Kuwait may have fewer opportunities to use SOEs as agents of innovation policy than some other countries, opportunities nonetheless exist and appear currently to be underexploited.

*The lack of an overall STI policy and the limited STI awareness and capabilities in field ministries do not allow them to effectively contribute to the development of the knowledge economy in Kuwait*

The STI projects in sectoral ministries are carried out without a dedicated STI policy, which hinders their effectiveness and contribution to the achievement of the overarching national goals. According to information collected through interviews, ministries' direct interventions are initiated in a rather bottom-up way, via direct interactions with companies in their respective areas and research institutions (KISR mainly in all areas, the Dasman Diabetes Institute and the Jaber Al Ahmad Centre in health). Several ministries' projects are carried out, at their initiative in most cases, within the framework of the MRDP. However, this does not compensate for the lack of a proper STI policy with a strong direction towards clear targets to serve the overall national overarching strategy.

Ministries do not generally have any department nor staff in charge of managing innovation. Managers in research institutions emphasised the lack of interest of ministries for STI projects that were submitted to them and their conservatism, often said to be related to a risk-averse culture and the pressure of stringent budgetary and auditing rules. These are inconsistent with the inherent uncertainty of research and innovation activities and the flexibility and autonomy needed for their implementation.

*KFAS remains limited by its small scale of operations to fulfil its multiple roles*

KFAS plays at least three crucial roles in Kuwait's research and innovation system: 1) science communications; 2) research funding; and 3) innovation support.

The science communications task is important in all countries, but especially so in a society that is still transitioning towards a knowledge economy and where current political and policy decisions do not yet reflect the economic importance of research and innovation in development. Part of the task comprises

publicising, explaining and trying to increase the public's enthusiasm for science. Another element is encouraging the use of research evidence and rationality in decision-making, thereby supporting the functioning of democracy. KFAS also lobbies for science and research and directly influences specific government policies – as some of the leading scientific academies do, for example in the United States (the National Academies), the United Kingdom (the Royal Society and the British Academy) and the Netherlands (the KNAW). These are difficult tasks, and ones whose effectiveness is hard to measure. They are nonetheless very important. A major risk for KFAS is that its other roles crowd out these important activities.

KFAS' role as a research funder and an innovation support body is in other countries tackled by research and innovation agencies, most often as separate organisations, however with different scopes and governance arrangements. For instance, the United Kingdom Research and Innovation (UKRI) is a governance umbrella that gathers the seven research councils, Innovate UK and Research England; the Research Council of Norway has an extended scope from basic research to research-based innovation and multiple functions (including operating the tax credit and the funding of several research institutes; in Singapore, the Agency for Science, Technology and Research (A\*STAR) governs several research and innovation support bodies. These wide entities aim to consolidate and better co-ordinate the different funding streams. In Kuwait, KFAS has, in practice, taken on the roles of both a research agency and an innovation agency. However, it remains limited by its small scale of operations and does not have the financial means to be fully effective in either of these roles.<sup>10</sup> KFAS also plays a particularly important role in one of its growing priority areas: health research. In co-operation with the Ministry of Health, KFAS funds research initiated by physicians in hospitals through its calls for research proposals. The Ministry of Health does not have a budget for funding research in hospitals, but it provides in-kind resources (including physicians' time).

## 1.5. The higher education and research system

A higher education and research system is instrumental for not only supporting the national production of knowledge and economic innovation, but also for strengthening the country's absorptive capacity of international knowledge and maintaining links to developments in world science and technology. This function of science is particularly important for smaller countries and countries at a relatively early stage of development of their innovation capabilities to support the catch-up process. Higher education and research activities should be performed, as noted in the previous section, under the guidance of cascading strategic frameworks, from the overarching national strategies down to the strategies of each institution, in turn translated into college, department or sector action plans. This process is oriented and supported by public funding using mainly block institutional funding and competitive project funding and by different policy instruments and regulations.

This section presents the main conclusions of the assessment of higher education and research institutions' performance, research capacity, funding mode, and governance structure. Recommendations as to how these institutions' activities could best contribute to the country's knowledge-based diversification are presented later in this chapter.

### 1.5.1. Research and higher education institutions' performance

Research and higher education institutions (HEIs) have the increasingly difficult task of being ubiquitous: they must deliver excellent research globally and still provide the relevant knowledge and skills (embodied in graduated students, trained adults, technologies, community services, start-ups, etc.) that will serve national needs of government entities, business companies and more generally the civil society.

**Research excellence:** While innovation does not always need to draw on scientific knowledge, it is nevertheless clear that innovation, especially at the frontier, increasingly depends on scientific progress. Advances in science increasingly determine advances in technology, as illustrated by developments in information and communication technologies and, more recently, biotechnology and nanotechnology, where science and technology are intertwined. As many countries pursue a knowledge-based development trajectory in which research holds a key part, competition in science has increased dramatically in the last decades and has now become global. Besides the relevance to local and national needs, scientific excellence can only be understood – and assessed – on an international scale.

**Effective and relevant teaching:** The original and often unique mission HEIs created before the 1990s, in Kuwait as elsewhere, is still their main role, although research is becoming increasingly important (for instance for their evaluation and ranking internationally or to assess their staff internally). An adequate supply of individuals qualified at a higher education level is indeed a key factor in enabling economies to shift towards higher levels of knowledge intensity and allowing industries to move up the global value chain and, in the case of economies like Kuwait, transition towards the knowledge economy. Internationally, increases in higher education graduate rates have typically gone hand in hand with improved adoption and absorption of technological and process innovations, advances in productivity, and the wealth creation associated with this. These developments are driven by not only the advanced subject knowledge students acquire through higher education, but also the wider transversal skills sets they are able to develop through pursuing their education to a higher level.

*The basic education system is generally well-funded, but still does not provide enough quality students to higher education, in particular in science and engineering*

Although the focus of this Review is on research and innovation, the provision of higher education is also a key component of the assessment, since investment in human capital is crucial for innovation, technological development and long-term growth. Kuwait has recognised the importance of education in its planned development trajectory, as evidenced by official strategic documents (e.g. the Kuwait Vision 2035 and MRDPs) and, more concretely, high government spending in education in regional and international comparison. This has not yet translated into better education outputs, as measured by the literacy rate of teenagers or performance in international mathematics and science tests – Kuwaiti children achieve some of the lowest scores in the TIMSS international comparison. While high government expenditures have enabled good learning conditions in primary and secondary education (notably the combination of high enrolment rates and a low pupil-teacher ratio), the quality of teaching seems to be rather poor, as assessed by Kuwaiti citizens according to the World Economic Forum (Schwab, 2019). A comprehensive reform of the primary education system is addressing the issue by reforming curricula and introducing a competence-based approach to replace the legacy system of rote learning. However, secondary education is yet to be reformed.

In higher education, KU's student-staff ratio is at the unfavourable end of the range seen internationally, with one academic staff member for 24 students, which is less favourable than for other universities in the region, with major universities in neighbouring Saudi Arabia and the United Arab Emirates averaging a ratio of 7-10 students per faculty (Times Higher Education, 2019). Moreover, class sizes at KU are said to have grown in many cases to exceed agreed limits, as a result of a decision by the ministry to increase student numbers by 2 000 without increasing faculty numbers. The PAAET's staff-student ratio is similar to that of KU.

Another concern, especially when it comes to the contribution of education to research and innovation, is that the proportion of pupils that continue into higher education is modest in international comparison. Moreover, students in Kuwait (Kuwaitis in great majority) are less inclined than in other Gulf and OECD countries to opt for degrees in science and engineering and tend to cluster in education studies or administration and law. At KU, for instance, teaching activities are dominated by the social sciences and

humanities (which accounted for 70% of its 36 287 students in 2017/18). At the PAAET, only 20% of the 39 156 students are in the faculties of technology studies or health science.

This problem is not new, and institutions such as the Ministry of Education and KFAS are making significant efforts to increase public awareness in favour of scientific education and culture and bring the quality of teaching closer to international standards, notably in STEM education (see below).

*Kuwait is losing ground in international and regional competition for excellent research*

Using a wide array of indicators, different international rankings show that Kuwait's universities are positioned at low levels on many respects, and in particular with regard to research performance. The 2020 and 2019 THE placed KU in the range 801-1 000 (down from the rank 601-800 in 2018) globally, well below King Abdulaziz University in Saudi Arabia (201-250), Khalifa University in the United Arab Emirates (351-400) or Qatar University (401-500) (Times Higher Education, 2019).

A bibliometric analysis of research and HEIs' scientific outputs support this overall assessment (CWTS Leiden University, 2015). The volume of scientific production in Kuwait (the bulk of which originates from KU) shows a clearly increasing trend, as seen in almost all countries worldwide. However, it grew at a much slower rate than in many countries between 2000 and 2018, including other Gulf countries on average, leading to a decrease in its world ranking in terms of number of publications normalised by the population. Kuwait's share of publications in all Gulf countries has also fallen sharply, as countries like Qatar and the United Arab Emirates developed their research capacity during that period.

Even more worrying is the low quality of Kuwaitis' research in global comparison, as measured by the proportion of documents published in the world's 10% most-cited publications. This suggests a particular deficit at the highest levels of research. Kuwait is also among the worst or close to the worst performers in the GCC in terms of international research collaboration since 2007, after it had performed much better in the late 1990s. These collaborations have – in Kuwait as in most other countries – a positive impact on the research quality.

### **1.5.2. Higher education and research institutions' research capacity**

Universities and publicly supported research centres form the backbone of national higher education, research and innovation systems. These institutions play a particularly important role in research and innovation, not only in equipping people with high-level skills and performing basic and applied research, but also in creating, sharing and exploiting knowledge of direct benefit to the wider economy and society.

Universities increasingly face the challenge to balance their different missions (often in a context of tight budgets) and to ensure linkages between these activities so that they mutually benefit each other. In many OECD countries, higher education and research institutions try to achieve sustainability by specialising in certain fields and areas. They therefore strive to profile themselves in areas of activity where they are strong – or have clear potential to be strong – and to differentiate themselves from other institutions. Governments in several countries support this process, for instance through the establishment of performance contracts or providing dedicated funding for strengthening the strategic profiling of universities in order to improve their capacity for enhancing the quality of research, as is the case in Finland through the Academy of Finland. Universities are invited to apply for funding with concrete plans for improving the conditions for high-quality/high-impact research, detailing proposed profiling measures with clear schedules for each step. In Norway, research institutes are engaged in direct dialogue with the Research Council of Norway in order to develop plans to improve those with below-average performance.

*Higher education institutions' research capacity remains insufficient to contribute to Kuwait's transition towards a knowledge economy*

The main HEIs in Kuwait, in terms of number of students and amount of research performed, are KU, PAAET and some 12 private universities, of which at least 7 perform research (for instance the Gulf University for Science and Technology, the Australian College of Kuwait and the Kuwait College of Science and Technology), while others are purely teaching universities.

As the primary and initial mission of these institutions is teaching, their research capacity is directly determined by the proportion of faculty that is “research active” and to what extent. As many other universities have found in making the transition from being a teaching university to a research university, the teaching culture tends to persist and it is hard to find time or resources for research unless strong incentives and proper conditions are in place to support this shift. KU, for instance, was established in 1966 and performed very little research until research activities were added to its mission in 1979. Currently, about 1 600 KU academics are expected to dedicate 30% of their time to research as per an informal university rule. However, data on research activities (publications and research project per staff), backed by interviews with university officials, tend to show that not all faculty is engaged in research at that level.

Such behaviour is probably linked more to the persistent teaching culture and the lack of an effective incentive structure, rather than the actual teaching load, which is similar to other countries like France, where professors find much more time to dedicate to research. At PAAET, where the teaching load is higher, the lack of flexibility to shift the teaching/research balance, for instance by buying-out some time with project grants, is an impeding factor.

The main incentives in place to encourage KU academics to engage in research are related to career advancement, linking promotion to an associate or full professor tenure to publishing a certain number of articles, as well as overall performance in teaching and outreach. However, there appears to be little motivation for individuals to seek promotion nor, once they have been promoted to a professorship, incentives for them to continue doing research. Financial incentives were, recently introduced at KU and PAAET for faculty members who publish in highly cited journals. International experience casts doubt on the effectiveness of such incentives to maintain a sustainable and systematic research effort or to spread research culture in the longer term. Studies tend to show that career incentives and institutional incentives (e.g. using different types of performance-based funding of universities) are more effective than individual incentives in strengthening the research capacity, in terms of both volume and quality (Franzoni, Scellato and Stephan, 2011; Arnold et al., 2017).

Involvement in research in other universities where research features less prominently in their mission – or not at all as in the case of PAAET – is even more modest. However, it is increasing at PAAET and in some private universities (as shown by the increase of their respective volume of publications). A small but growing number of private universities are doing some research and are able to win KFAS research grants in competition with Kuwaiti organisations such as KISR and KU. Some of them, such as the Gulf University for Science and Technology, reached a level of publications per staff similar to that of KU, although their teaching load is higher. These activities remain, however, small at the national level in terms of amount of research performed and results obtained.

Because of the long-standing “Kuwaitisation” policy, expatriates account for a small number of academics at KU and PAAET and their role is in most cases essentially to enhance capacity and fill gaps for a limited period of time, rather than strategically build specific capabilities in universities' priority areas. This is very different from the practice in countries that are highly successful in research, such as Sweden, Switzerland, the United Kingdom and the United States, as well as small countries like Luxembourg, which encourage a high inflow of talented foreigners into faculty positions and usually make it possible for them to become citizens. In effect, they exploit a talent pool that is much bigger than their country could provide.

A recent survey of academics from business colleges in Kuwait shows that non-Kuwaiti academics are more satisfied than Kuwaitis when working in private universities, but less so when working at state universities (Al-Mutairi, Naser and Al-Enezi, 2017). This is due to the much lower job security, since they are not eligible to get a tenured job in one of the state universities, a factor which often makes them go to another country, frequently in one of the neighbouring GCC countries, which offer better conditions. Changing this single provision would make state universities much more attractive, because non-Kuwaiti staff are actually very satisfied with most of the other dimensions, including the sense of achievement, ability utilisation, creativity, independence, social service and social status. Other issues that need improvement for both Kuwaiti and non-Kuwaiti staff include opportunities for advancement, recognition of work well done, and implementation of the universities' policy and practices.

This is all the more problematic since a significant number of non-Kuwaitis will retire in the coming years. It is not clear whether there is sufficient capacity to train enough Kuwaiti researchers with the relevant competencies to replace them.

*KISR is still far from achieving its objective of becoming the “region’s most highly respected STI and knowledge gateway” and an “international centre of excellence” by 2030*

KISR, created in 1967, was for many years the only research-performing institution in Kuwait and is still by far the largest applied research institution, in both scale and scope.

KISR was last evaluated in 2000 and no evaluation or review of it in recent years provides an updated overview of its current performance. Most of the recent data originating from its monitoring system and other sources support the idea that the amount of research activity has increased. However, despite significant efforts, there has not been any major improvement in the field of research commercialisation in recent years, partly due to the fact that KISR still operates in a challenging environment (small private sector, limited innovation awareness and capabilities of potential public clients):

- The number of publications monitored by KISR has remained rather stable in recent years, following a significant increase between 2013 and 2015. The number of publications (overall and for publications in highly cited journals) remains below the Institute's annual targets in 2017/18 and 2018/19 (except for co- publications with international partners).
- The number of research projects completed has increased significantly since 2012/13.
- The number of contracted projects has more than doubled between 2016/17 and 2018/19, but the total value of contractual research in 2017/18 is slightly under what it was in 2013/14 (and below KISR annual KPI target). The value of research grants obtained competitively from KFAS does not show significant improvement since 2014 (albeit in a context of decreasing KFAS allocated grants since 2016), although the institution represents about half of KFAS R&D budget.
- The number of patents granted has increased in recent years, but remains small for an organisation of this size (eight in 2017/18 and 5 in 2018/19). For comparison, in a very different environment, MIMOS Berhad, an IT research institute of less than 900 employees in Malaysia, filed 87 patents in 2017.
- KISR has still not received any revenues from licensing patents. Apart from project grants and contract research, KISR's external revenues come mainly from services to various ministries, not from research commercialisation. At the time of writing, KISR's Commercialisation Policy still had not been enacted.

However, this report is not an evaluation of any specific Kuwaiti institution, not even one that account for almost all the national applied research capacity. The mixed performances highlighted above find in great part their roots in the environment in which KISR operates, notably a very small private sector, a limited research and innovation budget and the absence of a dedicated national innovation policy to steer a collective effort in this area.



*KISR has undertaken significant steps to counter long-established structural weaknesses, but concrete and significant results are still to materialise – and be evaluated*

An evaluation of KISR in 2000 and the KRRP review in 2007 revealed issues hindering KISR's ability to deliver on its objectives. They pointed notably to the process of Kuwaitisation that affected KISR's access to expertise in some crucial areas, to issues with project management and managerial leadership. Despite the time lag between these exercises, both concurred that the institute had issues with research commercialisation and more generally the ability to engage adequately with customers. Among the main external factors hindering its ability to successfully achieve its mission was the need for improvement for ministry oversight and the lack of a national STI policy, which slowed down KISR's efforts to devise its own strategy and to maintain a division of labour with others doing research in Kuwait.

Since then, KISR has engaged in the "KISR Transformation" project, which has entailed a significant reorganisation, clarification of processes and the introduction of strategic planning tools during the period 2010-15. One key dimension of this initiative was the gradual shift from a traditional R&D organisation serving the current needs of clients – ministries and oil companies for the most part – to a more forward-looking and result-oriented organisation. This ambitious project faced some staff resistance, which significantly delayed its implementation. Concretisation of this endeavour were, for instance, the creation of the STS Sector and the Marketing and Commercialisation Sector. Some related initiatives were still being rolled out in 2018, such as the creation of a high-level internal scientific advisory committee. The evaluation of the "KISR Transformation" project is currently performed internally as part of the preparation of KISR's 9th Strategic Plan.

Interviews conducted with some of its main public and private partners as part of the current Review show that despite significant internal reforms, KISR still needs to significantly improve its organisation, processes and culture. The most frequent limitations emphasised by several of its corporate partners are: the difficulty of concretely co-operating with KISR due to insufficient result orientation and commercialisation focus; modest capabilities and insufficient equipment even in an area like petroleum research; insufficient focus leading to undersized engagement and underperformance in priority areas such as desalination. In no way should this list be deemed exhaustive or representative. However, it provides some information on the perception of KISR by external partners. They generally also emphasise that the budgetary and regulatory environment in which KISR operates as a government organisation – without exemption related to the specificity of research activities – may lead to suboptimal outcomes.

Although KISR management (central and at department/centre level) points to the progress accomplished, it also in majority supports the idea that the long-awaited transformation is still underway and will require more time. Like their partners, they emphasise the external factors that could be improved in order to improve KISR's potential to drive further development of the Kuwaiti economy:

1. establishment of a clear national STI policy to guide their activities and of a commensurate and stable budget to fulfil strategic objectives
2. stronger absorptive capacity in both the private and the government sector
3. easing the burden of bureaucracy and increasing the level of operational autonomy through simplification of regulations and procedures (e.g. related to recruitment, budgeting, equipment purchase) that may lead to red tape, delays and rigidities
4. enhanced ability to recruit and retain skilled staff due to opportunities offered by industry, notably in the oil sector, where salaries are higher
5. improvements in strategic planning and ability to implement priorities (see infra sub-section on "governance").

An internal review of KISR's operations and achievements was performed as part of the preparation of its 8th Strategic Plan (2015-20). It emphasised insufficiency of manpower and, in particular, experienced

researchers; challenges in addressing clients' specific needs; limited priority-setting resulting in a long list of planned research activities; and the burden of internal processes such as procurement and recruitment, resulting in long delays (Arman, 2017).

Despite progress in recent years, KISR may still be seen as too "inward-looking". In some areas (water desalination, for instance), it has implemented new practices for engaging partners, notably ministries, earlier and on a continuous basis in their projects, in stark contrast to the traditional supply-push approach. These initiatives could be assessed and, if deemed beneficial, promoted internally.

*KFAS centres have improved following comprehensive evaluations, but there is still room to make them more effective and efficient.*

KFAS manages two external centres with significant research activities: the Dasman Diabetes Institute (DDI) and the Jaber Al Ahmed Centre for Molecular Imaging and Nuclear Medicine.<sup>11</sup> The 2014 Strategic Review of KFAS concluded that these centres were consuming a large and growing proportion of KFAS' total disposable funding and that the foundation seemed to have limited control over these centres due to management and governance mechanisms in need of improvement. In response, KFAS and the centres initiated important internal reforms to improve their performance and strategic focus.

KFAS also engaged in negotiations with the Ministry of Health to try to at least share the governance and funding of these centres, with some success. An agreement has been found, whereby the ministry supports the centres with in-kind resources. However, these research centres still represent an important component in KFAS' budget in a context of increasing pressure on resources and growing demand for its support services. A refocusing and formalisation of KFAS' role as a research and innovation agency would make the question of the relevance of these centres under KFAS' purview even more pressing. It is not uncommon to have research agencies funding research institutes (i.e. Norway), but this is done with governance arrangements (for instance, via performance contracts) that ensure the strategic orientation of these institutes by the funders, a sustainable budget by public authorities and the operational autonomy of these institutes to fulfil these objectives.

DDI was set up on the instructions of the Amir in 2006 and funded by KFAS. It was intended to provide a combination of diabetes research and public education about diabetes, in an effort to reduce the very high prevalence of the disease in Kuwait. A peer review in 2014 expressed concern about the lack of focus and orientation towards specifically Kuwaiti problems in the institute's research strategy. As in other institutions in Kuwait, its research agenda appeared more as a bottom-up collection of individual researcher-led projects than driven by an overall strategy from the top, leading to dispersion and sub-scale research in a very competitive global environment. It urged reform, and the separation of treatment from research, with the Ministry of Health to take over the costs of treatment. Since then, a change of leadership, the development of a research strategy and significant restructuring has enabled refocusing the institute, and the Ministry of Health has agreed to take over treatment costs. Recent data tend to show some significant improvement in terms of volume and quality of research activities, which are yet to transform into innovation results.

JAC is a facility for advanced medical imaging and the production of a radioactive isotope used in imaging. It provides diagnostic services for the Ministry of Health and carries out a very small amount of research. For this centre as well, KFAS has initiated discussion with the Ministry of Health regarding the preparation of a sustainability plan to provide viable alternatives to handing the centre back to the Ministry of Health and developing a research strategy.

### **1.5.3. Research and higher education institutions' funding**

Government funding of research activities is not only a way to cover – partially or fully – the costs related to the public mission of advancing knowledge, contributing to innovation and supporting economic and

social development, it is also a way to steer these activities towards national priorities. Public funding of research institutions is therefore used as a financial incentive to drive institutions' activities at different levels (the institution as a whole, the faculties and departments, teams, and individual staff) towards achieving their objectives.

Most countries use a combination of institutional funding for longer-term research and project competitive funding. Institutional funding is distributed within institutions according to specific modalities, depending on their internal strategy and the way this funding was allocated to them. An increasing number of countries (Australia, Norway, Spain, the United Kingdom, etc.) link the institutional funding of research and higher education institutions to their performance (e.g. performance-based institutional funding) and their future plans (e.g. performance contracts), while still providing a stable funding base (funding based on size and history). Project funding is provided most often through competitive tenders through funding bodies of various types and forms, such as research councils, science foundations, innovation agencies, as well as ministries themselves. Such bodies fund research relevant to their specific responsibilities (such as general scientific knowledge, health, transport, environment, etc.). Considerable operational knowledge on the best practices for conducting competitive funding of research has been accumulated in the last two decades.

*Government funding for research institutions is marginal and unstable*

The institutional funds provided annually by the government to KU and KISR, the two main research institutions in Kuwait, have been very volatile in recent years, hampering mid- and long-term planning, which is essential for such activities.

At KU, the overall budget has stagnated since 2013/14 (and its operational budget severely declined in 2015-17) despite rising numbers of students. Nevertheless, according to the International Monetary Fund, spending per tertiary student remains high in international comparison, about 60% above the GCC average, and more than double the OECD average (IMF, 2018).

The institutional budget dedicated to research (not including staff cost) dropped drastically during the period 2013-17 and tended to be 1-2% of the operational budget, which reflects that research is still not seen as a priority, not only by the Ministry of Finance but also, as claimed by faculty members, by the University Council and leadership. Even when accounting for staff costs, using the assumption of 30% of faculty time spent on research (according to an informal but well-known rule in place at the university) – which is, however, lower in practice – the research budget remains small (7% of the operational budget of the university in 2017) (discussed in more detail in Chapter 2, see Table 2.3). While the university points to the budget restrictions imposed by the Ministry of Finance, the Ministry of Finance stresses that some planned research expenditures were not realised, due to the limited research capacity of KU. In turn, low research budget execution can find its roots in both the limited research capacity of KU and the many bureaucratic restrictions that hinder research activities. While there is not sufficient evidence to disentangle this issue, the faculty interviewed highlighted the devastating effect on its motivation.

KISR's budget is also very volatile and fell by more than half in 2018/19 relative to the previous year. Annual variations are mainly related to large construction projects and, to a lesser extent, to some wave of government projects related to the national plans. However, even when excluding the cost of construction, KISR's institutional funding in 2018/19 (KWD 47.3 million) was slightly lower than what it was in 2013/14 (KWD 51.2 million). Its external income (including research grants and contracts, as well as various types of technical and advising services) between 2014 and 2018 was 9-16%. This compares to about 65-70% in equivalent organisations in continental Europe, and 85-90% in the Nordic countries.

According to available data, research accounts for a very small portion (0.06%) of the PAAET's total annual expenditures.

*The mode of allocation of government research funding generates major inefficiencies in research planning and implementation*

The institutional funding provided to KU and KISR is based on budget lines and is directly negotiated with the Ministry of Finance, without any formal relation to past performance (apart from budget execution) and limited consideration of the plans of these institutions. Moreover, the recent imposition of more fine-grained budgeting exacerbates the financial problem of these institutions and impedes strategic flexibility. KU's budget, for instance, which formerly had eight lines specified by the ministry, has now been restated in some 2 000 budget lines among which it is very hard to reallocate resources. This goes against the current trend of increasing autonomy and performance-based governance and funding of universities in many countries.

The tighter control of the civil service commission and auditing services results in delays in the procurement of goods and the recruitment of staff, and consumes a great deal of effort. Bureaucratic procedures also constrain these institutions' ability to respond to external calls. For instance, KISR cannot respond to a call for tender if the amount was not foreseen in the previous budget. Voluntary contributions are also subject to approval by the Ministry of Finance, which slows down KISR's responses to external offers and hinders co-operation with industry.

Finally, external funding of both KU and KISR is deducted from the institutional funding provided by the government, so that there is no monetary incentive to do research. All staff efforts to secure external funding therefore result in extra work to implement the related projects, without funding to cover the related additional costs.

*The absence of a proper research agency for allocating competitively research funding impede improvement in quantity and quality of research*

Through its Research Directorate, KFAS supports the advancement of science and research in Kuwait in different ways, mainly through the allocation of research grants, but also through its support to researcher and research institutions' capacity building and networking.

Besides the institutional funding received by each institution, KFAS is the main source of external funding of applied and, to a lesser extent, basic research in Kuwait. It manages a portfolio of grants, which respond to different needs and are adapted to various project sizes. A 2014 peer review of KFAS noted a "pattern of performance improvement" of its research grant scheme and called for further efforts to improve its efficiency and impact. In recent years, KFAS has made significant efforts to improve its efficiency. The Research Directorate has streamlined its processes and adopted proposal assessment and selection measures, based on standard international practice in the form of national and international peer reviews. These efforts have had some results, as evidenced by the significant decrease of its management cost ratio, now close to those of research funding organisations in leading OECD countries. KFAS' impact is more difficult to assess in the absence of recent studies and because the performance of KFAS-funded research reflects, largely, the weakness of Kuwait research as a whole. A bibliometric analysis performed on the period 2002-13 showed that KFAS-funded research projects were of lower quality (as assessed by citations) than those of other funding bodies in the GCC, such as the King Abdulaziz City for Science and Technology in Saudi Arabia.

As previously mentioned, KFAS' broad mandate and limited budget hinder its performance. Its total contribution to research projects through grants and their average size has decreased since 2015 (and so has its overall budget since 2014). This has raised concerns among its senior management as to whether the foundation can still have a real impact. Researchers also emphasise the importance of this complementary and less bureaucratic source of funding, as they are asked by their respective institutions to increase their engagement in research activities. Most KFAS-supported projects receive co-funding (often reaching over 50%) from the beneficiaries themselves (in particular in the case of KISR), hence a

rather high leverage effect, but a rather weak incentive for collaboration since projects seem to be mainly composed of one participant. The vast majority of other research projects are funded internally by HEIs and research institutes (as part of their internal calls for proposal), which means that they are not exposed to external competition and less frequently to the demands of an external client.

While KFAS allocates most of its research funds competitively, it also supports more top-down and strategic so-called “flagship project programmes” that address more directly national priorities (for instance, funding provided to KISR in water or renewable energy). It, however, has neither the necessary resources nor the mandate to accompany these projects beyond pilot demonstration and support the scale-up of these activities. The transfer of successful pilots to ministries has sometimes caused long delays or projects to be dropped altogether.

Due to its hybrid quasi-public status, KFAS has been increasingly subject to two types of pressure. On the private sector side, its “shareholders” exert a growing pressure to diminish the levy that finances its budget. On the public sector side, it is asked to serve national interests by accepting to fund and manage government initiatives that divert it from its core mission – the one that in most other countries fall under research and/or innovation agencies.

This problem can only get worse as the system grows and the national need for research funding increases. A government decision is needed about how and where to create a research council in Kuwait. The issue of the creation of a national research agency with government funds – and of the evolution of the role and status of KFAS in this new landscape – will therefore inevitably arise. Having performed a similar role since its creation, KFAS has accumulated the experience, formalised process, reputation and network of experts needed within a research-funding agency.

#### **1.5.4. Research and higher education institutions’ governance**

*KU’s governance arrangements are not conducive to setting priorities or to making difficult choices*

A large council, chaired ex officio by the Minister of Higher Education, governs KU. The Under-secretaries of Education and Higher Education are members as are three eminent Kuwaitis who represent the government sector and another three from the private sector. The university president, secretary general and 17 heads of faculties are members, so there are 19 university and 9 societal representatives in a body of 26 people. The colleges are largely self-governing, without external representatives.

These arrangements allow for some societal influence on the university’s overall direction, but this influence is reduced due to the power of colleges, where academics play a strong role. Over the past three decades or so, European universities have – at varying speeds and under different forms – been moving from collegiate governance to executive governance with societal representation. The board, with a majority of societal representatives, sets the institution’s strategy and appoints the rector, while academic aspects of governance is left to the academics. This shift in strategic power away from individual departments and colleges has allowed “smarter” orientation and profiling of universities.

The KU Strategic Plan for the period 2013-17 was detailed and comprehensive, although – as in many university plans – it was perhaps too ambitious and no option appears to be left out. It clearly indicated that many of KU’s difficulties were well understood internally, recognising the need for improvements in many dimensions of university performance and monitoring progress assiduously. A simple comparison between objectives of the 2013-17 strategy and apparent achievements shows significant gaps in many respects (in higher education and in research). Some decisions – not all pertaining to KU – have even been contrary to the thrust of the strategy. One example is the Ministry of Higher Education’s requirement for KU to take 2 000 extra students without allocating any extra budget, whereas the objective was to

improve the student-to-faculty ratio. Similarly, neither graduate studies nor research has expanded significantly during the period, in stark contrast to the strategy's goals in that respect.

In contrast with its predecessor, the current KU Strategic Plan 2018-2022 is a very concise document, presenting some generic objectives and goals. This overall plan was then completed by the different units proposing their project under each large heading. Such a document may prove insufficient to provide the necessary strategic guidance to balance the powerful bottom-up dynamics that characterise higher education institutions, in Kuwait or elsewhere. This strategic plan was rarely referred to during interviews and appeared to have a limited impact as an authoritative and inspiring strategic framework of reference.

*KISR has a well-established five-year strategic plan, but its governance and strategic orientation process could be improved*

KISR is governed by a Board of Trustees, chaired by the Minister of Higher Education. Other members represent major stakeholders, mainly in the government sector (Ministries of Planning, Oil, Public Works, Electricity and Water, etc.; Kuwait Industrial Bank). KFAS is also represented in the board.

KISR has developed five-year plans since 1979, with significant efforts put into improving strategic planning and correcting the former plans' revealed weaknesses, especially since the 7th Strategic Plan, albeit in a context of a lack of experienced staff. Each recent plan has been the occasion of a thorough, mainly internal, review of achievements and gaps. These used to focus as much on the development of KISR itself as on the delivery of technological and societal change. KISR involves its clients and stakeholders (Ministries, SCPD, government agencies, K-companies, etc.) early in its strategic planning process in order to identify their problems and focus on relevant solutions. Most of them (at the exception of KPC) however do not have a formal or even informal innovation strategy and their inputs can only be limited to drive KISR's activities. KISR's intention, expressed in the 8th Strategic Plan (2015-20), is ambitious, which states that KISR should become a regional centre of excellence by 2025 and an international centre of excellence by 2030, setting a continuity across the 8th, 9th and 10th strategic plans. The ongoing plan is very detailed, with a short synthetic overall report and comprehensive documents for each centre and sector. KISR also has a monitoring system with KPIs and annual targets, covering most of the dimensions of its activity.

All of KISR's board members are government employees. While these include representatives of ministries that control important parts of industry (such as oil, water and electricity) and which are important customers for KISR, the absence of private sector (and international) input at this level tends to reinforce KISR's inward-looking strategic perspective. KISR's strategy aligns easily with the priorities of the national MRDPs, since it works in the traditionally central areas of Kuwait's economy.

Moreover, the limited absorptive capacity and strategic intelligence in both government and business mean that KISR receives only relatively weak external signals about needs. The same factors make it hard for KISR to push advantageous changes through into practice on those occasions where it is able to propose significant improvements, as was, for example, the case in the early years of applying reverse osmosis in desalination.

In order to improve its strategic guidance, KISR will create during the course of the 9th strategic plan an Advisory Council constituted of four to six internationally renowned leaders in the field of science and technology. In addition, a dedicated Advisory Board, composed of representatives of relevant national institutions will be created to support the orientation of each KISR Research Centre.

*Bureaucracy and rigidities are significant obstacles to doing research and innovation efficiently*

Staff in all research and higher education institutions report that high levels of bureaucracy and inefficient processes place many obstacles in their way and prevent them from achieving their strategic objectives,



such as long lead times for obtaining equipment and permission to hire support staff, as well as low wages and short contracts for research support staff.

## 1.6. Business innovation

### 1.6.1. Framework conditions for innovation

A business environment favourable to starting and doing business is an important pre-requisite for boosting innovation. Innovation activity also requires medium- to long-term investment and planning over long product innovation cycles from idea to market.

A stable financial system is therefore crucial to ensure investment in innovation and adequate returns on investment, and a sound regulatory framework is conducive to the generation of new technologies and helps them be rapidly diffused. An appropriate education system is also necessary to provide the skills required by an innovative workforce. In addition, importantly, innovation requires technological prowess and a culture of experimentation and risk-taking.

*Kuwait provides a stable macroeconomic environment, but lags behind on many policy dimensions critical to doing business*

In spite of recent improvements, Kuwait has room for improvement in global rankings of its entrepreneurial ecosystem. In 2019, the World Bank's Doing Business ranked Kuwait 97th out of 190 countries, compared to 11th for the United Arab Emirates; for starting a business, Kuwait is ranked 133rd (the United Arab Emirates is 25th). Likewise, in the World Economic Forum's Global Competitiveness Index, Kuwait performs significantly below its GCC peers on dimensions relating to market competition, non-tariff barriers to trade and rules for foreign direct investment.

When asked about the most problematic factors for doing business, Kuwaiti companies quote: inefficient government bureaucracy; corruption; restrictive labour regulations; need for improvement of the work ethic in national labour force; and an inadequately educated workforce (Schwab, 2018).

In its four missions to Kuwait, the OECD Review team carried out more than 111 meetings, some of which were organised as focus groups with several parties organised by topic of interest. The team met with government entities (including ministries); research institutes; HEIs; public funds; non-profit organisations; business councils; and 47 businesses, including 9 financial companies, 4 logistics companies, 3 ICT companies, 6 oil and petrochemical companies, 4 electrical and machinery companies, and a number of companies from other manufacturing (medical, pharmaceuticals, chemicals, food, etc.) sectors. Five facilitator organisations such as incubators, accelerators and fablabs were also visited, and seven start-up companies interviewed. In those interviews, land was seen as an issue and a real barrier to growth, as getting industrial land at attractive locations is very difficult for non-oil companies. The cost of land is much higher than in neighbouring Saudi Arabia, and sometimes not available at all.

Standards and regulations are an issue. Getting a license is tedious and requires a lot of effort. Standards are not harmonised across the GCC and this causes issues with companies operating regionally. In the food industry, one bottleneck is the food and drug lab (only one for the whole country) and delays are very long (sometimes the product spoils before it is tested). In Saudi Arabia, private companies can get their labs certified and act as official testing facilities.

Companies are asking for a governmental strategy for diversification (e.g. in the petrochemicals sector), awareness-raising events such as a national STI conference, and national innovation awards. Companies mentioned subsidies available, for example, in Qatar for participation in international exhibitions, as well as subsidies for foreigners to come and visit the local industry.

When technological innovation is involved (e.g. in fintech), a regulatory sandbox is provided by Central Bank of Kuwait to facilitate innovation. Regulatory sandboxes are specific arrangements whereby regulations are made more flexible to accommodate an emerging technology whose impact has yet to be tested in order to determine the appropriate regulation for the future. Sandboxes provide for temporary flexible arrangements for a limited amount of time, in order to allow pilot implementation of innovative products or services. Access to finance is limited to bank credit, which is quite readily available. However, venture capital for start-up ventures remains scarce. According to interviews, there are few venture capital funds (Arzan, Faith capital and Impulse), but there is also a small number of viable start-ups, so it is difficult to expect massive influx of venture capital.

*Education and skills gaps are a serious challenge to businesses*

In spite of strong spending on education, the performance of the Kuwaiti educational system remains modest. As previously mentioned, Kuwait performs modestly in the TIMSS international measurement, both compared to GCC countries and much lower than the OECD average. Kuwaiti authorities are aware of this fact, and a reform of primary education is under way. Secondary education has yet to be reformed.

Concerning tertiary education, the World Economic Forum's *Global Competitiveness Report 2017/18* ranks Kuwait very low, with the quality of math and science education being ranked 106th out of 137 countries surveyed (compared to 13th for the United Arab Emirates and 6th for Qatar); availability of scientists and engineers 98th; quality of management schools 111th (15th for the United Arab Emirates, 7th for Qatar); and local availability of specialised training services 121st (24th for the United Arab Emirates, 22nd for Qatar).

The skills gap in Kuwait is particularly acute, and represents a strong hurdle which Kuwait needs to overcome. Several sources confirm this trend:

- In a 2008 survey, only 32% of the surveyed chief executive officers 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 PricewaterhouseCoopers, 2008). This is the lowest percentage within the entire Middle East and North Africa region. Skills required by the chief executive officers were most importantly, communication skills, teamwork, analytical and critical skills, initiative, language skills, innovative and creative thinking, while memorisation skills were considered less important. On the other hand, curricula were considered to be based on theory rather than practical knowledge (for 71% respondents in Kuwait).
- In 2017, the Berkeley Research Group interviewed a limited sample of 35 entrepreneurs to inquire about the most important issues when choosing location, and talent availability ranked 4th after the market, lifestyle and government regulations. The score for Kuwait on the talent dimension was 3.8/10, and for Dubai 7.3/10. This was one of the weakest dimensions for Kuwait in this survey (Berkeley Research Group, 2017).
- The World Economic Forum's *Global Competitiveness Report 2017-2018* confirms that work ethic and an adequately educated workforce remain two among the six most modestly performing factors for doing business in Kuwait (Schwab, 2018).
- Interviews carried out by the OECD Review team indicate that such skills gaps persist. Entrepreneurs confirmed that skills in IT, design and professional services remained very scarce, and caused many companies either to delocalise from Kuwait or to find arrangements such as teleworking at a distance in order to ensure the proper skills. In addition, it is difficult to attract expatriates to Kuwait, due to more attractive options elsewhere in the Gulf region.

*Kuwait's labour market does not provide appropriate incentives for entrepreneurship*

The labour market is very specific in Kuwait and presents a strong split between the private and public sectors, as well as a split according to nationality, with differing conditions for Kuwaitis and non-Kuwaitis. This is a disincentive for Kuwaitis to engage in the creation of new business ventures.

The job market duality is notably illustrated by the difference in monthly wages, with the average monthly earnings (including basic salary and various allowances) for Kuwaitis nine times higher than for non-Kuwaitis (KWD 1 113 vs. KWD 120 in 2015). This can only partly be explained by the difference in average education level. When comparing like for like education levels, the gap is still more than eightfold for the lowest levels of education: a Kuwaiti with primary education or below earns an average of KWD 850, while a non-Kuwaiti will make KWD 100. At university education level, the gap is still more than 2.5 times, with a Kuwaiti making KWD 1 350 and a non-Kuwaiti KWD 490, just above half of what an uneducated Kuwaiti makes (KCSB, 2015).

Part of the explanation for these wage gaps lies in the fact that most Kuwaitis work in the public sector, while expatriates work in the lower paying private sector. Kuwaitis choosing to work in the private sector will receive a monthly compensation to cover the wage differential, called “workforce support” (*daam amala* in Arabic).

A large majority of 92% of Kuwaiti nationals are employed in the government sector (86%) and state-owned enterprises (6%). However, a significant part of government jobs are occupied by non-Kuwaitis (about 100 000 positions, or 25% of the total government jobs, corresponding to about 8% of non-Kuwaiti employment). A majority of these non-Kuwaiti public sector employees work in the health and education systems. The private sector is the largest employer of non-Kuwaitis, employing 49.5% of non-Kuwaitis<sup>12</sup> and a minority (8%) of Kuwaiti nationals (KCSB, 2011).

Such a situation clearly affects the incentives for entrepreneurship and innovation. In particular, a Kuwaiti national considering an entrepreneurial venture has to forego lucrative employment in the public sector and create a company subsisting only on the “workforce support” stipend<sup>13</sup> until the company can generate revenues and sustain the entrepreneur. The National Fund can provide a loan, but not if the entrepreneur plans to bring a non-Kuwaiti on board and offer equity.

For non-Kuwaitis, the situation is even less appealing, since they need to find a Kuwaiti sponsor before they can even register a company, and even then, their equity stake is limited to 49%.<sup>14</sup>

Going forward, the labour market poses extraordinary challenges. While the Kuwaiti government has been able until now to allocate significant budgetary resources to the creation of public sector jobs for its citizens, it will become increasingly difficult to create enough public sector jobs for all the workers entering the labour market. According to IMF estimates, the unemployment rate of Kuwaiti nationals increased from 1% in 2000 to 4.7% in 2015.

*Overall, Kuwaiti businesses are quite innovative, but R&D intensity remains low*

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 and 2019 on a sample of 2 326 companies, by the Kuwait Central Statistics Bureau (KCSB), with strong support from the KFAS and the SCPD, as well as a consulting company – GOPA. Even though the survey faced many challenges and does not meet the quality standards of reporting in OECD countries, it offers some initial insights (Box 1.2).

## Box 1.2. The dedicated Kuwaiti innovation and R&D survey

### Methodology

The Kuwaiti innovation and R&D survey was carried out by the Kuwait Central Statistics Bureau (KCSB) and the Kuwait Foundation for the Advancement of Science (KFAS) with methodological support from the GOPA consulting company, based on its experts' 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 model questionnaire using international guidance contained within the Oslo Manual (OECD/Eurostat, 2019). 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. Consequently, 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 10 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 10 years in existence 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 were the three years 2015-17.

### Results – Innovation

Overall, 43% of Kuwaiti companies confirm having innovated in either product, process, marketing or organisational structure in the three years 2015-17.

Only 21% of micro and about 38% of small companies innovate, while 54% of medium-sized and 72% of large<sup>1</sup> companies do.

Partially or totally state-owned enterprises report a higher rate of innovation (respectively 60% and 50%) than privately owned ones (42%). This difference can partly be attributed to the size, since state-owned enterprises are large enterprises.

Sectoral analysis shows strong innovation performance in the mining and quarrying sector (100% of a sample of 3 companies innovate). Significant R&D activity exists in Kuwait Petroleum Corporation and its subsidiaries<sup>2</sup> (in particular Kuwait Oil Company), based on co-operation with external partners such as Schlumberger, as well as the Kuwait Institute of Scientific Research. The Kuwait Petroleum Company is aiming at establishing its own full-fledged R&D centre by 2023. Among the services sectors, the most innovative is health and social work (75% of a sample of 16), followed by education (60% of a sample of 58), as well as recreational, cultural and sporting activities (56% of a sample of 16). In manufacturing, chemicals and chemical products companies are also fairly innovative, with 50% of a sample of 20, as was the food industry, with 47% of a sample of 88, while other manufacturing sectors are less innovative (below 40%). Among the least innovative sectors are furniture manufacturing and hotels and restaurants.

Among other expenditures relative to innovation, the most common ones were acquisition of machinery and equipment (42% of the businesses), design (19%), training (15%), and the acquisition of knowledge (12%).

Only 31 companies (representing 3.1% of the innovating companies) have received public financial support for innovation activities. Of these, 13 have been supported by the KFAS, 9 by the Public

Authority for Industry for customs exemptions, and 4 mentioned support from the Industrial Bank of Kuwait. Only one company mentioned the National Fund.

### Co-operation in innovation

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 in Europe or the Gulf Cooperation Council (GCC), or a client partner from the GCC. The most valued partners are suppliers (27%), enterprises from the same group (20%) and private sector clients (12%), followed by consultants (6%) and academic partners (6%).

### Research and development

Research and development is performed by 21% of all enterprises and this percentage varies from 9% for micro enterprises to 36% for large ones. On average, the companies have 4.5 R&D employees, ranging from less than 2 in micro enterprises to about 8 in large companies. Average spending on R&D per company is about KWD 47 000 (USD 150 000), ranging from KWD 4 500 (USD 15 000) in micro to KWD 115 000 (USD 380 000) in large companies.

Likewise, a great disparity is found across sectors, with 67% (2 out of 3) of enterprises in mining and quarrying performing R&D, followed by 42% (5 out of 12) in the paper sector then chemicals (40%), health (38%), wood and paper (34%), education (31%), financial services (28%), and food and beverage (24%).

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

Note: Exhaustive results of this survey are presented in Chapter 5.

1. At the launch of the survey, there was no official definition of small and medium-sized enterprises in Kuwait (see Box 5.6 in Chapter 5). For the purpose of this survey, companies were categorised according to the number of employees: micro (0-9), small (10-49), medium (50-249) and large (250 and over).

2. Please note that these companies did not participate in the survey.

Source: Kuwait Innovation and R&D Survey, Kuwait Central Statistical Bureau, KFAS and SCPD.

The survey finds that 46% of the companies innovate and 21% of all companies perform R&D, albeit at a low scale (average size of R&D departments is 4.5 persons, ranging from 2 in micro companies to 8 in large ones). There is a certain volume of R&D in the oil sector, mostly performed by the public research institute KISR and through foreign partnerships. Kuwait Oil Company has a Research and Technology Division which does not do the mainstream R&D, but works with new and emerging technologies and technologies that need to be transferred in, such as the digital reservoir model, and using concentrated solar power to generate steam for enhanced oil recovery. In total, there are 81 projects worth about KWD 10 million per annum. They have partnerships with KU, the KISR and foreign providers. The objective is to create an integrated R&D centre, the KPC International Petroleum Research Centre, by 2023.

Outside the oil sector, the most R&D-intensive sector is the chemicals sector. In the services sector, health is the most innovative sector (75% innovate and 38% do R&D). In addition, there is a large number of patents in the medical sector. A group of medical doctor inventors has been mobilised to create a Centre for Medical Innovation. Examples of their inventions: a novel biodegradable balloon system used in kyphoplasty (spine surgery); 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 by cardiac catheterisation without using surgical intervention. However, this initiative, led by NASCO, has not managed to rally support from the Ministry of Health.

*Co-operation and business-academia linkages are very low*

Co-operation in R&D and innovation is rare (only 14% of innovative companies engage in co-operation) and linkages with academia are very weak, since companies prefer working with suppliers, other enterprise group companies or clients.

During the interviews with companies, the OECD Review team heard that co-operation with Kuwaiti research organisations is difficult, due to lengthy processes of engagement, misalignment between research and the needs of companies, the bureaucratic approach of the KISR and KU, and the inability to move from theory to practice. In addition, there is a lack of incentives (the KISR, for example, gets its base budget reduced by the amount received from a private entity, thus cancelling any incentive to engage in projects). Similarly, secondment of researchers from academia to business is not possible under the institutional rules of KU and the KISR. Another issue was the lack of information sharing, which hampers the emergence of new ideas in interactions with the KISR, for example.

### **1.6.2. Financial support instruments for innovation, both direct and indirect**

Innovation is subject to significant market failures, and market mechanisms supported by framework conditions alone usually result in underinvestment in innovation and levels of innovation achieved are below socially optimal levels.

This situation justifies government intervention to stimulate innovation in businesses. Direct financial support includes instruments such as direct grants, subsidies, loans or equity funding, and is usually used to support longer term and more radical forms of innovation. Indirect instruments include fiscal incentives such as tax credits, which mainly boost short-term applied research and incremental innovation (OECD, 2015b).

Direct funding provides the advantage of selection according to specific criteria, such as technical merit and feasibility, market prospects, contribution to the resolution of specific societal challenges, or other policy goals. The disadvantages are the relatively high resource requirements for its implementation (need for individual project review and approval) and the limited ability of government to “pick winners”. A way around this issue is in a “funnel” or “stage-gate” approach, whereby at an initial stage, a large number of projects are supported with minimal selection and successful projects within that sample are further supported by more substantial subsidies. Such a phased approach is applied, for example, in the US Small Business Innovation and Research Program and similar programmes in Japan, Korea, the Netherlands, Sweden, Chinese Taipei, the United Kingdom and, most recently, Australia and Canada.

Tax support for R&D is given as indirect support to R&D, according to the principle that R&D spending can be deducted from taxes in an enhanced way compared to other business expenses. Tax credits have the advantage of being relatively simple to administer (their processing is included within the usual tax processing). However, targeting is more complex and a certain amount of the support is lost to free riding (i.e. R&D spending that would take place regardless of the incentive benefits from windfall gains). It is worth noting that even in an environment with no corporate tax, a tax credit could work as a negative tax (i.e. a subsidy). In some countries, tax credits are given regardless of whether the company is making a profit or not (i.e. in some cases when the company is loss-making, a tax credit will result in a cash payment to the company).

*There is very little direct or indirect financial support for innovation and R&D*

The only targeted instruments for R&D are those provided by KFAS Innovation and Enterprise Directorate, which offers grants and exposure to international knowledge providers.<sup>15</sup> KFAS provides funding of the initial phases to identify the problem and the solution and finds the partners. In one example, KFAS brought Fraunhofer to Kuwait and co-financed initial stages of co-operation between a local food company and a local polypropylene producer to make wrapping which detects rotting of meat products. The programme is very limited for the moment and works with a pool of 20 companies and sponsors on an average of 15 projects per annum for a total budget of less than USD 1 million. This type of initiative should clearly be scaled up. In addition, it should be noted that, due to its statute, KFAS cannot finance the company itself, only the external partner.

There are no tax credits or other fiscal incentives for innovation. Some equipment can be exempted from customs upon authorisation by the Public Authority for Industry.

The National Fund for SMEs has a very large (USD 6.6 billion) endowment. However, the support it provides (presently in the form of loans) is targeted at start-up entrepreneurship, with no specific provision for innovation. Indeed, some of the rules of National Fund loans tend to discourage technology start-ups to apply, such as the rule that all equity must belong to Kuwaitis. Since some skills are difficult to find among nationals (for example software development skills), entrepreneurs need to source those skills from abroad and thus need to be able to offer equity to non-Kuwaitis, and this is impossible under National Fund rules. The National Fund also faced many operational issues, which resulted in a very low number of loans being disbursed in its initial years of operation. There have been successive reforms to try to improve its performance, and the private sector is now on the Board of the National Fund. Equity instruments for seed financing are also foreseen.

Additional support is available from a specific SME fund managed by the Industrial Bank of Kuwait. It provides Islamic finance for entrepreneurs exclusively for the purchase of physical assets (equipment). The Industrial Bank of Kuwait purchases the asset and leases it to the entrepreneur. However, staff costs and working capital cannot be financed from this source.

A small number of venture capital funds operate in Kuwait (Faith, Arzan, KFH Capital), but there are still some barriers for efficient operation of private equity, such as provisions for share splits, bonus shares or preference shares.

There is no legal framework for crowdfunding in Kuwait.

### **1.6.3. Intellectual property rights**

The comparative advantage of a firm or country no longer depends on traditional inputs such as land, labour and physical capital. Firms in both developed and developing nations increasingly cite intellectual property as their main driver of growth. Intellectual property therefore needs to be protected, most often through patenting, but also through trademarks, industrial designs and as trade secrets.

There is growing evidence that intellectual property rights affect foreign direct investment decisions around the world. Committing adequate resources to the administration and enforcement of intellectual property rights can help attract foreign direct investment and promote innovation and technology diffusion (Primo Braga and Fink, 1998).

*Kuwait has adopted some of the main international frameworks for intellectual property rights...*

Kuwait is a member of the World Intellectual Property Organization (WIPO) and, as a member of the World Trade Organization (WTO), is also signatory of the WTO Agreement on Trade-related Aspects of

Intellectual Property Rights (TRIPS). Kuwait also adheres to the Arab Convention for the Protection of Authors Rights and the Berne Convention for Protection of Literary and Artistic Works.

According to the World Economic Forum's Global Competitiveness Index 2017-2018, Kuwait ranked 80th out of 137 countries in terms of intellectual property protection. Kuwait is a net importer of intellectual property.

Kuwait joined the WIPO Patent Cooperation Treaty (PCT) in 2016 and was the sixth and final Gulf Cooperation Council member state to accede to the PCT (WIPO, 2016). Any PCT application filed on or after 9 September 2016 will automatically include the designation of Kuwait. Kuwait is bound by the optional Chapter II of the PCT.

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.

*...but needs to do more to protect intellectual property in the digital age as well as trade secrets*

The next steps include accession to the WIPO Performances and Phonograms Treaty and the WIPO Copyright Treaty – the so-called WIPO Internet Treaties – that set up a comprehensive copyright and related rights management and enforcement model system for the digital age. In May 2016, Kuwait's National Assembly passed the new Copyright and Related Rights Law.<sup>16</sup> The new copyright statute contains provisions that regulate related rights and apply to performance artists, sound record producers and broadcasting organisations (STA, 2017). Thus, this law represents an improvement over previous legislation, as it will help Kuwait accede to the WIPO Performances and Phonograms Treaty.

Kuwait does not have a separate statute that regulates a trade secrets law exclusively. Hence, firms use robust and strong contractual provisions as a strategy for protecting trade secrets. However, this approach has shown its limitations and a strong trade secrets law could be instrumental in improving intellectual property protection and monetisation as a lot of intellectual property (especially process-related and business practice-related) is not typically protected through patents or copyrights.

*With local patenting options being unstable, inventors prefer USPTO patents*

Patent protection in Kuwait used to work exclusively via the GCC Patent Office. In April 2016, the Kuwaiti Ministry of Commerce and Industry started regulating patent protection in Kuwait via Law No. 115/2016, implementing the previously issued Patent Law (No. 71/2013)<sup>17</sup> 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.<sup>18</sup> However, in 2017, Kuwait reinstated the national intellectual property office for examining patents.

It is noteworthy that more than 90% of patents from Kuwait were filed with the USPTO and not locally. Practitioners attribute this mostly to prestige associated with USPTO filing. Another reason is the relatively small market in Kuwait, where it makes little business sense to obtain intellectual property protection.

*A patent pipeline has been initiated, but the market value of these patents is questionable*

The activity of technology transfer offices at both KU and KISR has thus far been focused on handling inventions claims from research staff, whereby those inventions were forwarded to a US attorney who drafted proper patent applications and filed them with the USPTO.<sup>19</sup> The Sabah Al-Ahmed Centre for Giftedness and Creativity (SAC) provided the same service for individual inventors.<sup>20</sup>



In addition, the government provides a KWD 1 000 cash payment to every inventor who is granted a patent through SAC. If the inventor works at Kuwait University, they are eligible for up to KWD 2 500, and up to KWD 7 000 for a group of inventors.

Such a policy resulted in a rapidly growing pipeline of patent applications, which reached a peak of 116 applications in 2013. Starting in 2014, support was only provided to selected inventions, and thus the number of applications stabilised at 80-85 per annum for 2014-16.

A seemingly respectable pipeline of patents has been thus generated (448 between 2010-17), spanning sectors such as medical technology (58 patents); transport (35); furniture and games (35); control (30); civil engineering (30); measurement (26); other consumer goods (25); chemical engineering (21); other special machines (20); and others.

However, out of this portfolio, only one has been commercialised to date. Several medical technology patents seem to have market potential and commercialisation options are being investigated by NASCO, a subsidiary of the National Technology Enterprises Company (NTEC).

#### **1.6.4. Support to technology diffusion through start-ups, science-industry co-operation and place-based policies**

Technology diffusion and its widespread adoption unlocks productivity gains and growth. 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 the country along with greater use of technology for economically productive purposes.

This is why a sound innovation ecosystem must have entities (such as technology commercialisation offices)<sup>21</sup> or programmes (such as technology extension services),<sup>22</sup> 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.

These institutions should provide not only easy-to-access and affordable infrastructure (typically office space and/or laboratory space), but also specific services, including consulting for business strategy, product development and intellectual property protection, among others. In addition, those accelerators should provide contacts and networking to facilitate access to finance and a range of professional services, including legal advice, accounting, recruitment and so forth.

Place-based policies include cluster policies. The definition of a cluster varies, but the general idea is that a firm can have its competitiveness enhanced if it is embedded in a cluster of competitive suppliers (which will provide high-value inputs at competitive prices), strong competitors (whose competitive pressure will encourage continuous improvement within individual firms), sophisticated clients (which will set expectations for high-value products) and responsive local government (which will create regulatory conditions for competitive operations). Cluster support policies can aim to create new industry clusters through co-ordinated action for R&D activities and service support for entrepreneurs. They can also be geared at internationalisation by opening access to international markets and knowledge flows; or they can support networking platforms to facilitate science-industry interaction such as in excellence centres and science parks (OECD, 2015b).

##### *A start-up ecosystem is emerging, but critical mass is yet to be achieved*

There is a fledgling start-up ecosystem in Kuwait. Role models are Talabat and Carriage, two online retail companies that have been quite successful. Their founders were able to exit their investments profitably through a sale to a foreign entity for amounts in excess of USD 100 million each. This triggered a (limited)

wave of technology<sup>23</sup> start-ups launched in 2017 and 2018 in a variety of business-to-consumer sectors, as well as a fintech and a healthcare technology platform – a number of these (less than ten) have been able to raise some funding.

A number of private sector incubator and accelerator programmes are active in Kuwait. 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). However, the training and mentoring aspects are typically less developed than the real estate office space component.

One of the most advanced programmes for entrepreneurs is that of Zain Great Ideas with Brilliant Lab, focused on training entrepreneurs who want to launch technology start-ups, and the best applicants are offered an acceleration programme in San Francisco with “Mind the Bridge” and a visit to the Silicon Valley. Recently, several fablabs have been set up to facilitate prototyping, essentially by providing computer-aided design and 3D printing services to entrepreneurs.

However, entrepreneurs who start up in Kuwait often move out, typically to Dubai for market and regulation reasons, or to Egypt for reasons of costs and ease of hiring talented people.

In the interviews with entrepreneurs, the OECD Review team heard that financing of start-ups is an issue. While the entrepreneur is entitled to “workforce support” subsistence (if a Kuwaiti national), it is much lower than the alternative of a government job. Financing from the National Fund is not necessarily a good option, since it forbids giving any equity to non-Kuwaitis. In addition, selection criteria lack transparency. Other issues faced by entrepreneurs include high fees for point of sale payments.

The National Innovation Centre is a new initiative that has been announced by the Amir in order to “*create an ideal environment for innovation and attracting Kuwaiti intellectuals, inventors, and innovators and entrepreneurs whose ideas contribute to supporting the Kuwaiti economy.*”<sup>24</sup> The scope and activities of this centre remain to be defined.

#### *Efforts at technology transfer have had limited success in Kuwait*

A number of initiatives have been set up to bridge the gap between research and commercialisation. They include technology transfer offices (TTOs) at KU and KISR, the NTEC<sup>25</sup> and the SAC.<sup>26</sup>

TTOs’ activity at both KU and KISR has thus far been focused on handling inventions claims from research staff, and the SAC has been offering the same service to individual inventors.

The commercialisation function of the TTOs has not yet commenced, due to a lack of human and financial resources. Namely, the status of TTO staff is that of support staff, which is much less attractive than the status of academics. Therefore, it is impossible to attract the talent that is needed for the successful operation of a TTO: people who have experience in both business and academia and are thus able to bridge the gap between both worlds.<sup>27</sup>

The NTEC was originally set up as a subsidiary of the KIA with the objective of investing in foreign technology firms and creating spill-overs in Kuwait. Through scouting local and regional markets, the NTEC identifies market needs and potential business opportunities in both private and 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.

There have been several attempts to achieve such technology transfer from foreign countries, in some cases acting in partnership with KISR. However, mostly what has been achieved is portfolio investment in foreign companies interested in doing business in Kuwait, without any significant technology spill-over.<sup>28</sup>

The NTEC faces problems to fulfil its mission, such as public procurement based on lowest price in tenders, giving little incentive for innovative technologies. Control by government regulators sometimes interferes with business decisions, such as asking for a tender to local companies instead of investing in a company with the right technology directly, exiting an investment at a certain point in time, etc. Financial audit has a very strong influence, emphasising financial results rather than technology transfer. Secondment of academics from KU to the NTEC is also not possible.

More recently, the NASCO subsidiary of the NTEC has started searching for promising local technologies. It has identified a niche of excellence in medical technology where a small group of 10 doctors have 20 patents with market potential. NASCO is facilitating a network that should lead to commercialisation of these inventions.

More broadly, academia-industry collaboration would be welcomed by companies, for example secondment of KISR's or KU's scientists to private companies. Today, this is not an option and academics need to take considerable personal risk if they want to switch to a business (be it a state-owned enterprise or in the private sector). In some sectors such as pharmaceuticals, there is no domestic academic base, so international linkages would be desirable. KFAS' Innovation and Enterprise Directorate is helping some companies in this endeavour, but awareness about this programme is still low.

### *Clusters*

The only significant industry clusters in Kuwait concern the oil sector and the energy and water utilities. In these clusters, there is a certain degree of co-operation between academia and industry, centred on specific research centres organised within KISR to provide academic research input. However, co-operation between the companies and KISR has scope for improvement.

#### **1.6.5. New industrial policy and mission-oriented policy**

Rather than focusing on state aid and creating national champions, new industrial policy focuses on facilitating co-ordination between economic agents, especially in strategic, future-oriented sectors (avoiding as much as possible defensive action for historic sectors). It also tends to focus on technologies, and increasingly on well-defined challenges or "missions", rather than industrial sectors. Typically, the technologies that can be encouraged are those known under the name of "Industry 4.0", including digital technologies (artificial intelligence, blockchain, quantum computing and 3D printing); biotechnology, nanotechnology and converging technologies; and others.

### *Industrial policy and mission-oriented policy do not seem to be available*

The past decade has witnessed a new rise of voluntarist industrial policies based on targeted and challenge-oriented public interventions in several OECD countries and beyond, in particular to tackle mounting societal challenges and/or to support competitiveness in priority areas.

Kuwait's industrial policy strategy was not communicated to the OECD Review team. According to interviews, priority seems to be given to large infrastructure projects, such as industrial cities to be created in the north and centre of Kuwait, as well as the development of Kuwait's islands. Priority is being given to the logistics and financial sectors, aligned with Vision 2035. Trade flows are foreseen to exploit the geographical position of Kuwait as a politically stable country providing a gateway to Iraq and the Islamic Republic of Iran. However, the OECD Review team has not been shown any evidence (such as market studies) as to the market demand for such intermediation – after all, both Iran and Iraq have their own access to the Gulf and it does not appear evident that they would need to transit through Kuwait.

The Kuwait Authority for Partnership Projects (KAPP) was established in 2008 and serves as the main body responsible for public-private partnership project implementation. KAPP has carried out 67 tenders

since 2013 and 2 projects have been completed and signed, notably the Shagaya Renewable Energy Park phase III for a combined project with photovoltaic, concentrated solar power and wind power plants of 2 000 MW total installed power and AZ-Zour North desalination plant. Nevertheless, there is a lack of a strategic vision for leveraging public-private partnerships in Kuwait and projects have been stopped, sometimes in very advanced phases.

An industrial park is being created in Shadadiya to provide SMEs with plots equipped with basic infrastructure and utilities. Such a project will ease the current difficulty of securing industrial land.

At the moment of writing, there seems to be no initiative preparing Kuwait for the Fourth Industrial Revolution, contrary to neighbouring countries. Interviewees noted that introduction of fibre is delayed in Kuwait by about ten years compared to neighbouring countries and Internet cross-connection fees (set by the ministry) are much higher than in neighbouring countries. At the same time, Qatar has a country-wide strategy for 5G introduction and the United Arab Emirates has multiple initiatives, such as Media City for the creative sector; Masdar, which aims to become the first carbon-neutral city; and the Blockchain Dubai initiative, which aims to base the city governance on the blockchain concept.

Additionally, and as previously mentioned, Kuwait has a tradition of bottom-up initiatives (at different levels: to develop the SCPD's national plans as well as higher education and research institutions' strategies) and few tools for mission-oriented research and innovation (the DDI in diabetes research and innovation; some KFAS flagship projects; KISR's R&D centres for the private sector to be created by 2021).

### **1.6.6. Demand-side policy and grand challenges**

Public procurement exceeds 10% of GDP in most OECD countries (in the European Union it averages 14% of GDP). This huge purchasing power offers an opportunity to foster innovation directly. A large government contract has the potential to provide sufficient financial returns to warrant significant investment in innovation from the bidding companies. This applies to a range of procurement items, starting from the very basic ones such as buildings, where functional requirements rather than fully technical specifications can foster innovation. In one example from Finland, a tender requests to provide a solution for locking the schools (rather than a tender for locks), inviting innovative solutions such as digital locks. It also applies to more advanced tenders to address societal challenges – one example is the search for commercial-scale low-carbon emissions mobility solutions.

*Demand-side policy and grand challenges do not seem to be a priority*

The only initiative that has been identified which is related to public procurement for the grand challenges is linked to renewable energies, such as the Shagaya project demonstrator with wind and solar energy production. This is consistent with the Amir's vision of achieving 15% renewable energy in Kuwait by 2030.

During interviews, several research actors involved in strategic projects with public authorities pointed at the lack of awareness of and capabilities for innovation in public administrations, which prevent them from fully playing their role on the demand side (through research contracts, innovative procurements, etc.).

## **1.7. Recommendations**

Going forward, Kuwait requires a clear strategy of promoting science, technology and innovation as a major enabler of the transition towards the knowledge economy and society, in order to warrant inclusiveness and well-being for all citizens and residents in the post-oil era. Such a strategy should be articulated around the following pillars: 1) raising awareness of and reducing the barriers to innovation; 2) setting up the appropriate governance mechanisms; 3) reinforcing the scientific research base; 4) developing support for business innovation; 5) fostering knowledge transfer and technology diffusion;

6) building up human capital; and 7) enhancing the role of STI in support of societal challenges. An overview of the recommendations is provided in Figure 1.1.

**Raise awareness and reduce barriers to innovation.** In particular:

- a Raise awareness and promote science, innovation and entrepreneurship as national values.** Motivation for entrepreneurship and innovation in the Kuwaiti context will mostly come from the quest for esteem and self-realisation, rather than the need to ensure a livelihood. Therefore, it must be made clear that innovators and entrepreneurs will acquire social recognition and status. The Amir’s initiative to create a national innovation centre is a case in point. An initiative from the top leadership is a signal to all stakeholders that “innovation is good”, a key component of Kuwait’s desired development path, and will be valued in society up to the top leadership. This initiative has to be followed up with consistent actions at all levels of government, which is the only way to build credibility and momentum for change. Such actions could include innovation and science competitions, prizes (“Entrepreneur of the year”, “Innovator of the year”, popularisation seminars for youth, etc.). In addition, initiatives in favour of citizen science can be encouraged, where members of the general public can contribute to scientific projects.
- b Continue improving framework conditions.** Kuwait has been improving its overall business climate in recent years through dedicated reforms. Those efforts should be pursued, and more specifically in areas which are seen as most problematic for doing business, in particular: inefficient government bureaucracy, restrictive labour regulations, corruption and work ethic in the national labour force. Reforms in company laws that specifically are relevant to start-ups and venture investors should also be considered, particularly pertaining to stock splits and similar equity operations, as well as insolvency and bankruptcy laws.
- c Unleash the innovative spirit of non-Kuwaitis by providing equal opportunity.** Advanced countries across the globe have leveraged the energy, scientific potential and entrepreneurial spirit of immigrants, by giving them equal opportunity, and in some cases openly attracting them. Non-Kuwaitis represent about three-quarters of the resident population, and many of them are second- or third-generation residents, and yet do not have the same rights and opportunities as Kuwaitis. This applies to education, employment and entrepreneurship opportunities. The best educational options should be open indiscriminately to Kuwaitis and non-Kuwaitis alike. Tenure in academic institutions should also be achievable for non-Kuwaitis and entrepreneurship rules should put non-Kuwaitis on equal footing with Kuwaitis. A non-Kuwaiti entrepreneur should be given the possibility to start a company without a Kuwaiti sponsor, and to access financial support on equal terms with Kuwaitis (e.g. from the National Fund).
- d Further involve Kuwait in regional and international co-operation.** Kuwaiti researchers are involved in scientific co-operation with international partners, but such co-operation is not sufficiently institutionalised. The Blue Ribbon report called for KISR to establish its centres as regional centres of excellence, but this regional dimension hasn’t materialised. Options should be explored for enhanced regional co-operation in areas of expertise such as water, petroleum, environment, agriculture and others. Kuwait could consider participation in regional science and technology initiatives such as the SESAME facility in Jordan.

**Set up the appropriate governance and institutions for the STI system** to integrate the different pillars of the system by: setting strategic orientations to guide the different communities of public and private actors towards common goals; co-ordinating the different interventions across the key government bodies (notably ministries and agencies in relevant policy areas); ensuring the investment of commensurate national resources and establishing a clear division of labour between the leaders of each line of intervention (including by creating new institutions when needed); collective monitoring of progress accomplished towards the common goals.

- a Develop an integrated national science, technology and innovation strategy coherent with the “New Kuwait” vision for attaining “Smart Kuwait” in 2035.** A collaborative process involving representatives of academia, business, civil society and government should be established to set a roadmap for the Kuwaiti STI system. In order to avoid the problems encountered by the Kuwait Science, Technology and Innovation Council (KSTIC), proposed as soon as 2007 but never created, these representatives could be gathered in a temporary high-level strategy group with the specific mandate of developing the strategy. To guarantee the strong legitimacy and leadership of this group despite its time-bound nature, its mandate should emanate from the highest-level of policy making, i.e. His Highness the Amir. Following international good practices, the strategy should have a long-term horizon (e.g. ten years) with a revision taking place after five years to align it with the SCPD’s mid-term development plans. Specific objectives should be set for STI to facilitate the “New Kuwait” vision of transforming the country into a knowledge-based society – “Smart Kuwait”, which should shift focus from resource exploitation to knowledge exploitation.
- b Create a wide-scoping ministry with an overall mandate for science, technology and innovation policy** as the major enabler of the transition towards “Smart Kuwait”. This ministry will be responsible for devising and implementing specific policies for STI to implement the integrated national innovation strategy, in co-ordination with other ministries and spanning the full innovation cycle from laboratory to the marketplace. The number of ministers being limited by the Kuwait constitution, a solution needs to be found in the framework of the restructuring of the Government of Kuwait, but a strong STI ministry will be the essential enabler of the transition to “Smart Kuwait”. This Ministry should have an initial task of drafting a multiannual action plan in close contact with a network of innovation “focal points” or “champions” in each implementing body (other ministries and agencies). Under the leadership of the STI ministry, these could meet regularly on an informal basis to co-ordinate their actions, monitor progress against clear input and output (need-based) objectives and review challenges in implementing the national innovation strategy. The creation of such interministerial network could be a first effective step to identify the relevant competencies across the government and raise awareness on the importance of the dedicated policy actions to realise the integrated national STI strategy. The action plan should include the establishment of specific financing instruments for the various segments of the STI system (higher education, public research organisations and businesses).
- c Create a fully professional research and innovation agency.** An autonomous and fully professional agency should be in charge of the management of the funding instruments and other initiatives that aim to support research and innovation activities in public and private organisations which execute the research. This agency would be responsible for tendering competitive research grants based on scientific merit, grants for business R&D and business-academia co-operation based on innovativeness, market potential and other criteria, and various initiatives to support entrepreneurship (in particular research-based start-ups, as well as innovative service and manufacturing ventures). The agency would also dedicate direct funding to larger strategic projects according to priority objectives within a defined timeframe. Such an agency needs to remain at arm’s length from the government to remain flexible and be fully autonomous from the policy-making level in operational matters in order to avoid any conflict of interest. It should report to its line ministry (i.e. the STI Ministry proposed above) with regards to its performance and realisation of its objectives. Creating this agency as a body subject to government rules would hinder its agility and effectiveness, which are key conditions for its success. Several international examples exist of organisations performing agency functions with specific status that guarantee their financial and operational autonomy (including for instance non-profit organisations with public service delegation; public organisation with special regime, etc.). Moreover, this agency should have a budget commensurate with its mandate and managed through sound ‘principal-agent’ governance rules to ensure the best use of these resources (i.e. setting of clear objectives, independence in

the realisation of the objectives, performance contracts for monitoring and funding). Its role should be clearly set out in its mandate in order to ensure that it is not redundant with existing entities, including performing institutions such as KISR and KU, but also KFAS. Currently, KFAS performs several of these agency functions, as a private non-profit organisation and without public resources. A new agency would therefore inevitably overlap with KFAS if the two entities are not properly coordinated. Moreover, KFAS has already accumulated significant competences which should be leveraged for supporting the creation of the agency. Two possible options are: i) transferring some of KFAS staff in the new agency and focusing KFAS on its other activities (capacity-building, awareness raising, service to companies, research centres, etc.); ii) delegating the agency functions to KFAS (with proper public funding and governance rules proposed above). Examples of delegation of public service to private or semi-private organisations exist and could be used as examples to scan the different possible options.

- d Improve the production of STI-related statistics to enable the development of evidence-based policies.** STI-related statistics do not exist in Kuwait. An initial innovation and R&D survey was organised in 2018 and 2019 for the purpose of this Review, and such surveys should continue and adhere to international standards. Similarly, the monitoring of budgets and scientific outputs at higher education institutions and public research organisations need to be significantly stepped up. The basis of STI-related statistics should allow an effective monitoring of the national innovation strategy. A dedicated unit could be established as an STI observatory with the mandate to follow STI-related indicators nationally and benchmark them internationally. This would allow reducing overreliance on international indicators.

**Reinforce the scientific research base** to ensure absorption of knowledge from international sources, as well as endogenous production of knowledge in niches of excellence. In particular:

- a Gradually increase funding for R&D in public and private institutions.** Overall spending on R&D is estimated at 0.33-0.37%<sup>29</sup> of GDP, less than a fifth of the 2% target set in the Blue Ribbon report 12 years ago, and only half of the spending realised in neighbouring UAE and Saudi Arabia. A roadmap would need to be established to ensure that the increased funding is spent on results-oriented research and development endeavours. Eligible themes would need to be defined in the national STI strategy, including projects which can help resolve societal challenges and the development of knowledge-intensive products and services in the Kuwaiti economy and the overall contribution to Kuwait's national development plan. A gradual increase can be achieved pending appropriate governance arrangements proposed in other recommendations. In particular, competitive research grants could ensure that only the best projects are financed, and performance-based contracts with institutions could guarantee that funding is linked to performance as measured by key performance indicators. In line with Kuwait's aspiration for a knowledge-based development path and practices of other resource-rich countries (Kazakhstan, Norway), a mechanism could be set to dedicate some of the resources from oil directly to a central "knowledge fund" dedicated to finance public and private HEIs and research institutions' research performance contracts, as well as other channels supporting research and innovation.
- b Introduce performance contracts for higher education and public research institutions.** The current budgeting principles for funding higher education and research institutions should be replaced by a simple multiannual performance contract containing a modest performance-based component (for instance 5-10% of the institutional funding by the government) including both higher education and research activities. The rest of the funding could be based on historical data and various input parameters (number of staff, number of students, etc.) and be allocated as a block and not per item lines as is currently the case. These performance contracts should be developed by the institutions based on their internal strategies and reviewed and negotiated with the STI Ministry mentioned above.

- c Remove the disincentives to external funding in HEIs and research institutions.** The funds raised by these institutions should not be subtracted from the institutional funding allocated to these institutions, as is currently the case.
- d Remove the bureaucratic barriers and streamline the basic processes involved in research activities in HEIs and research institutions.** A thorough review of the rules and practices (including those related to the Kuwaitisation policy) involved notably in recruitment, the purchase of equipment, research contract management and research proposal selection should be undertaken so as to remove excessive red tape leading to delays and diversion of efforts. If necessary a change of legal status of HEIs and research institutions should be envisaged to increase their operational autonomy, allowing them for instance to appoint academic and other staff using private law contracts, and purchasing equipment with greater flexibility.
- e Revise the incentive system in public universities to increase the engagement of faculty in research activities.** Public universities should review their respective career system, including the criteria for promotion to associate professor and full professor status, in order to assess whether they value sufficiently faculty research performance and provide incentives all along the career path. The promotion scale should also ensure recognition of high performance of full professors, including in terms of publications, patents, data and software publications, as well as collaboration with industry. Institutional incentives also could be developed by using an internal, performance-based funding system, where the research performance of an operating unit feeds back to the financial resources of this unit, providing opportunities and scientific esteem for its staff.

**Develop support for business innovation** in order to overcome the market failures of innovation, which include the high risk involved, the long-term horizon and the public good nature of innovation, which creates positive externalities not easily captured by the investing entity. Such support needs to be targeted both at the start-up/entrepreneurship phase as well as at the high growth phase of established companies, and address technological and non-technological innovation, as well as services innovation.

- a Help businesses to engage in R&D through dedicated support schemes.** Companies often see R&D as a high-cost and high-risk activity, with uncertain benefits. Such a market failure justifies governmental measures which seek to lower the cost and therefore improve the perceived cost-benefit profile of R&D. Therefore, simple innovation grants whereby 50% or more of a company's R&D project could be financed by a professionalised agency that is able to assess and to some extent advise the firms; the Austrian FFG (Industrial Research Promotion Agency) basic programme or the German Central Innovation Programme for SMEs (ZIM) are examples. Additional grants could concern non-technological innovation and services innovation. Kuwait should consider the introduction of R&D tax credit (in Kuwait where most companies are not subject to corporate tax, this would amount to a negative tax, or subsidy, equivalent to a certain percentage of incurred eligible R&D costs).
- b Create a holistic support mechanism for start-up companies.** Currently, the National Fund for SMEs provides mostly loans to start-up companies. However, some of the rules are too rigid for technology start-ups (such as the rule about 100% Kuwaiti-owned equity). In addition, start-up financing calls for equity financing, and therefore such instruments should be provided. In parallel, incubation and acceleration schemes should be set up to support entrepreneurs in setting up and developing their businesses and make them ready for investment. In addition, linkages to public research institutes should be encouraged for knowledge-intensive start-ups (see also recommendation 5.b).
- c Use public procurement to encourage innovation.** Existing procurement can be adapted to encourage innovative solutions by using functional requirements rather than technical specifications, as they can spur innovative solutions. Going forward, the solution to key societal challenges can be tendered out to encourage innovative solutions, rather than purchasing off-the-shelf technologies.



- d Support the upgrade of innovation capabilities in state-owned enterprises.** Introduce metrics of innovation in the governance of state-owned enterprises and require them to analyse and pursue trajectories in their industry. In Kuwait, this would mean enhancing the transition of industry from petroleum to petrochemicals, as well as considering spin-off technologies, such as the development of digital services currently provided in-house as a product offering (e.g. digital modelling of oil reservoirs, solar technologies used internally, etc.).

**Foster knowledge and technology diffusion and co-creation between science and industry** as equal partners, which can occur in three different aspects of “push”, “pull” or co-creation: 1) commercialisation of scientific discovery (“push”), both endogenous and imported through knowledge transfer and licencing; 2) contract research on demand from industry (“pull”); and 3) co-creation of knowledge in specific competence technology centres where projects are jointly decided based on both technological and market considerations.

- a Initiate support for technology diffusion and absorption policies.** Technology extension services could be offered to facilitate technology absorption with SMEs. This could be done in co-operation with international development banks or international networks, such as those supported by Fraunhofer and Steinbeis.
- b Develop a structured approach to creating links between business and academia.** Strong barriers remain between the business and academic communities. In particular, consider: introducing the “third mission” of co-operation with industry in higher education institutions; introduce private sector representation on the governance boards of KISR; organise events to create opportunities for business and academia to meet; reinforce innovation vouchers to initiate small-scale collaboration (building on KFAS’ “innovation research vouchers”); expand the collaborative grants for more mature projects (building on KFAS grant programmes); and create frameworks for effective spin-offs from KU and KISR.
- c Provide incentives for individual researchers to unleash their creative potential.** Researchers are not evaluated on their co-operation with business, and there are no schemes to promote mobility between the public and private sectors, such as an industrial Master’s or PhDs, entrepreneurial leave of absence for government employees who wish to start an entrepreneurial venture (with a guaranteed return to their original employment in case of failure), as well as subsidies for employment transfer.
- d Establish mechanisms for technology foresight and intelligence.** While certain projects in firms employ product roadmapping, there is scant understanding of technology roadmapping. A dedicated mechanism that conducts technology roadmapping especially in areas such as petroleum, which is a key driver of economy, and future technologies that underpin the Fourth Industrial Revolution, may help stakeholders better appreciate the rapid advances of technology and its concomitant opportunities/challenges.

**Build up the human capital needed for the transition towards a knowledge-based economy**, in particular:

- a Create a new public research university with a strong focus on STEM disciplines.** Such a university should help build up STEM skills needed in the digital economy, thereby preparing the future generation for employment within the Fourth industrial revolution. Building on the new law approved in June 2019, that calls for the establishment of one or several new government national universities, and consistent with the Kuwait National Development Plan policy, a new university should come with new, more progressive rules to attract top faculty members worldwide. It should be a full research university, with significant funding for research based on performance institutional funding and competitive grants. While some degree of competitive overlap might be beneficial in some disciplines related to key sectors of the Kuwaiti economy, it will be important that the new university develop a strategic profile that is distinct from existing organisations, in

particular KU, PAEET and, for applied research, KISR. International scientific collaboration should be strongly encouraged. Significant efforts (including regional and international benchmarking) should be dedicated to create this new entity under a legal status that protects it from the excessive bureaucratic rules and regulations, as well as the inadequate modes of funding that hinder the existing higher education and research institutions. Several university systems provide useful examples of status created to enhance the institutional autonomy of universities and reduce the bureaucratic burden – for instance the “Foundations” in Portugal.

- b Provide support for the establishment of strong doctoral schools** involving world-class faculty, creating conditions for young Kuwaiti researchers to stay in Kuwait for this ultimate formal training step, while contributing to the scientific “footwork” necessary to fuel basic and applied research within the country.
- c Improve absorptive capacity for innovation by supporting upgrades in vocational education and training.** Lack of specialised training is brought forward as one of the weaknesses in the World Economic Forum’s Global Competitiveness Report. A comprehensive evaluation of vocational training available at the PAAET and private universities would shed more light on reforms needed to bring vocational training to a satisfactory level. In order to create a market for specialised training, specific training vouchers could be considered, whereby government co-finances professional training for specific skills. Entrepreneurial learning could be introduced in upper secondary and tertiary education curricula. Introduce students at various levels, including intermediate and secondary levels, to essential concepts regarding innovation, emphasising ethical issues alongside related business practices.
- d Provide for career mobility between science and industry,** such as industrial Master’s and PhD programmes, as well as secondment schemes between academic and industrial careers, and entrepreneurial leave of absence, to enable researchers to envisage an entrepreneurial venture with an option to return to secure academic employment.
- e Attract and support internationally recognised researchers,** by setting the appropriate conditions and incentives. This would include revising the strategy and rules of HEIs and research institutions with regards to the recruitment and employment conditions of expatriate staff to allow them to fully exploit the potential of non-Kuwaitis to enhance their research excellence and innovation performance. Foreign researchers should be able build their career (including the possibility to reach leadership positions) in Kuwait higher education and/or research institutions in order to strengthen the local research base on a sustainable and long-term basis. For instance, a non-Kuwaiti scientist should be able to have tenure at KISR or a state university. Inspired by good international practices (for instance Luxemburg), Kuwait could also set up a specific scheme for attracting a few high-level researchers in priority areas and supporting the development of their research teams. These internationally recognised researchers would be selected not only based on their track record, but also on the basis of a clearly defined project in line with Kuwait’s national development strategy. For this to be possible, Kuwait could explore ways to exempt research and academic institutions from Kuwaitisation rules, including by providing citizenship to qualified individuals and talents.
- f Institutionalise nationwide forward planning of employment and skills.** The planning authorities should provide guidance to higher education institutions as to what skills and competencies will be most needed in the future and give them the possibility to regulate according to the flows of students among the different disciplines and specialties.

#### **Establish the role of science, technology and innovation in resolving societal challenges.**

- a Articulate the national innovation strategy around key economic and societal priorities.** Some ongoing initiatives address well-identified societal challenges, such as strategic “flagship” initiatives in the domain of renewable energies, the role of KISR’s Water Research Centre, and

that of the Dasman Diabetes Institute for the societal challenge of metabolic syndrome diseases. Structuring these initiatives around “grand challenges”, notably in the national innovation strategy, would allow a better targeting of these initiatives and would help build consensus around some key societal priorities to which research and innovation could significantly contribute.

- b Launch a few large challenge-based programmes under the MRDPs to tackle societal challenges in line with national priorities.** Since the national research and innovation system is not yet well developed and its research and innovation policy still to be formulated, it would be premature for Kuwait to develop an ambitious mission-oriented innovation policy (such as, for instance, the New German High-Tech Strategy and its 12 missions, or the mission-driven Top Sector policy and its 25 missions). A more realistic option would consist in setting a few large challenge-based programmes under the MRDPs to tackle societal challenges in line with national priorities, for instance in the water and energy areas. These programmes would aim to achieve concrete objectives in a defined timeframe, gathering all of the relevant research and innovation actors and using various instruments to cover the different stages of the innovation cycle, from applied research to demonstration and commercialisation. Beside their expected results, these programmes would also serve as a “test bed” for some of the new practices recommended in this Review: use of demand-side instruments (including innovative public procurement and regulatory reforms), additional strategic and performance-based funding for participating Kuwaiti institutions, increased openness to international scientists and innovation experts. Drawing on the best international examples, these programmes could also be used as a regulatory sandbox where the bureaucratic rules applying to research and innovation would be reduced. When enough experience has been accumulated, the lessons learnt during the implementation of these programmes could then be applied to the broader system.

Of course, all of these pillars are interlinked, and the success of transforming Kuwait into a knowledge-based society will critically depend on the balance of the policy mix achieved.

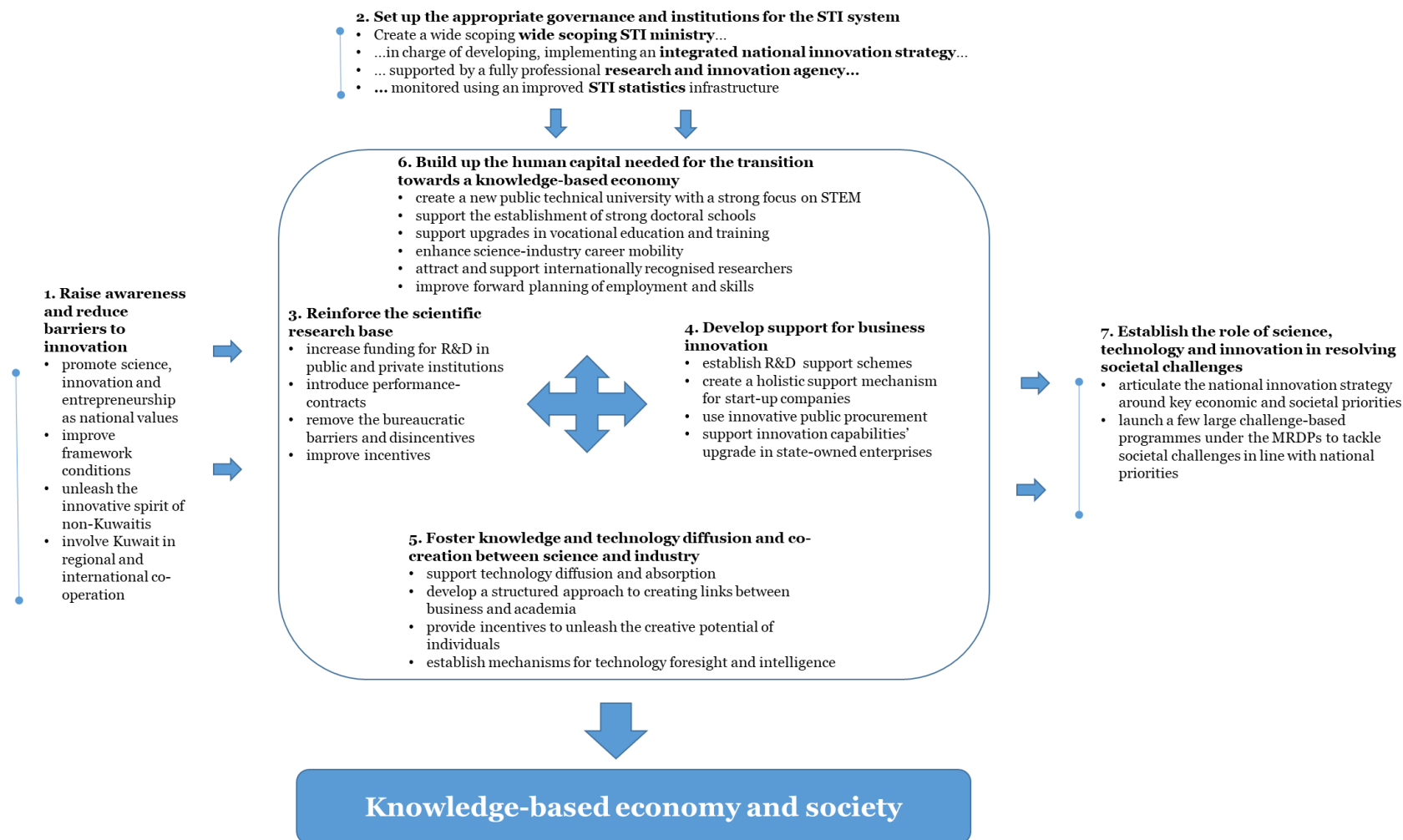
The sequence of implementation of these pillars depends on the potential of achieving a national consensus, which will create momentum for these ambitious reforms. It should be decided in a broad consultation process with the main stakeholders in the country.

Basically, two types of approaches could be envisaged:

1. A governance-driven approach where the first step would be the establishment of the top-level governance body which would need to develop a national strategy based on the findings of this Review, and a comprehensive stakeholder consultation. This strategy would then need to be implemented with an adequate governance set-up. Unfortunately, the likelihood of success seems quite limited, given the status of the discussions since the recommendation of the Blue Ribbon report in 2007 and the subsequent failure to establish an adequate governance set-up.
2. A pragmatic approach based on the establishment of the national innovation centre which has been initiated from the Amiri Diwan and can be seen as a new positive dynamic for Kuwait's national innovation system, in a demand-driven approach. A number of initiatives relative to the stimulation of business innovation and entrepreneurship from Pillar 4 could be implemented, accompanied by measures of linkages with academia (Pillar 5), by involving KU and KISR in the work of the centre. Initial successes (“quick wins”) should create a positive sentiment toward STI, and thus facilitate the establishment of an adequate governance set-up, as well as the creation of a general climate favourable to the drafting of a national STI strategy. In parallel, significant efforts should be devoted in the short to mid-term to improving the incentives and removing bureaucratic rules that significantly hinder the research and innovation organisations already in place (Pillar 3).

Figure 1.1 provides a bird-eye's view of the main recommendations and shows the interactions between them, all of them contributing together to the achievement of the knowledge-based economy and society.

Figure 1.1. Mapping of the main recommendations



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## Notes

<sup>1</sup> Powell and Snellman define a knowledge economy as “*production and services based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advance, as well as rapid obsolescence. The key component of a knowledge economy is a greater reliance on intellectual capabilities than on physical inputs or natural resources*” (Powell and Snellman, 2004).

<sup>2</sup> Non-oil refers to all sectors except oil extraction and refining.

<sup>3</sup> Court of the Amir.

<sup>4</sup> The evaluation also noted that the outlook for sustainability of the initiatives supported in partnership with KFAS was better, although to be confirmed.

<sup>5</sup> To such an extent that out of the 513 projects announced at the launch of the current MRDP, 421 projects originated from the previous plan. Only 92 new projects would be implemented during the period.

<sup>6</sup> On the English version of the site. The objective in the Arab version (as translated by the Review team) is different, but has the same weakness: “*Enhancing the research facilities of the institute to develop the quality of its outputs to serve the beneficiaries*”.

<sup>7</sup> Official statistics for R&D expenditure do not exist. Preliminary figure obtained by consolidation of data from Kuwaiti sources. Includes a very preliminary figure from the KNPC, which is awaiting confirmation/revision.

<sup>8</sup> For a more detailed discussion, please refer to Box 5.18 in Chapter 5.

<sup>9</sup> For reference, it was estimated in the report that R&D intensity was less than 0.2% of GDP in 2007.

<sup>10</sup> A more detailed analysis of KFAS’ role as a research and innovation funding body is dealt with in Section 2.5.3.

<sup>11</sup> Two other KFAS centres are the Scientific Centre of Kuwait and the Sabah Al Ahmad Centre for Giftedness and Creativity. These have other missions and no or limited research activities. For a discussion of the Sabah Al Ahmad Centre for Giftedness and Creativity’s activities, please see Box 5.16 in Chapter 5.

<sup>12</sup> According to the KCSB Census in 2011, 698 000 non-Kuwaitis were employed in the private sector, 575 000 as household employees, 117 000 in the public sector and 22 000 in other sectors.

<sup>13</sup> The amount is about USD 3 000 per month, but this represents only a fraction of what a government salary would be.

<sup>14</sup> In some cases covered by the KDIPA law, full foreign ownership is possible, but this typically does not apply to individual entrepreneurs.

<sup>15</sup> For a more detailed discussion of KFAS Innovation and Enterprise Directorate's activities, please refer to Box 5.14 in Chapter 5.

<sup>16</sup> Kuwait's Law No. 22 of 2016 Concerning Copyrights and Related Rights (K-CL 22/2016).

<sup>17</sup> [www.wipo.int/edocs/lexdocs/laws/ar/kw/kw013ar.pdf](http://www.wipo.int/edocs/lexdocs/laws/ar/kw/kw013ar.pdf).

<sup>18</sup> <https://www.export.gov/article?id=Kuwait-Protection-of-Property-Rights>.

<sup>19</sup> For a review of the KISR's and KUKU's TTOs' activities, see Box 5.17 in Chapter 5.

<sup>20</sup> For a review of the Scientific Centre of Kuwait and the Sabah Al Ahmad Centre for Giftedness and Creativity's activities, please refer to Box 5.16 in Chapter 5.

<sup>21</sup> For more details, see Boxes 5.3 and 5.4 in Chapter 5.

<sup>22</sup> For more details, see Boxes 5.1 and 5.2 in Chapter 5.

<sup>23</sup> Please note that "technology" start-up businesses in Kuwait usually refer mostly to online retail and service ventures, rather than companies based on commercialisation of proprietary knowledge.

<sup>24</sup> Extract from statement by Sheik Sabah Al-Ahmed Al-Jaber Al-Sabah, 2019.

<sup>25</sup> For a review of the NTEC's activities, see Box 5.18 in Chapter 5.

<sup>26</sup> For a review of the Scientific Centre of Kuwait and the Sabah Al Ahmad Centre for Giftedness and Creativity's activities, please refer to Box 5.16 in Chapter 5.

<sup>27</sup> For a review of KISR's and KU's TTOs' activities, see Box 5.17 in Chapter 5.

<sup>28</sup> For a more detailed discussion of the NTEC, please refer to Box 5.18 in Chapter 5.

<sup>29</sup> Official statistics for R&D expenditure do not exist. Preliminary figure obtained by consolidation of data from Kuwaiti sources. Includes a very preliminary figure from the KNPC, which is awaiting confirmation/revision.





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