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KUWAIT PROGRAMME

BREAKING OUT OF THE INNOVATION TRAP?

TOWARDS PROMOTING PRIVATE R&D INVESTMENT IN KUWAIT

HUSAM ARMAN, SIMONA IAMMARINO, J. EDUARDO IBARRA-OLIVO AND NEIL LEE

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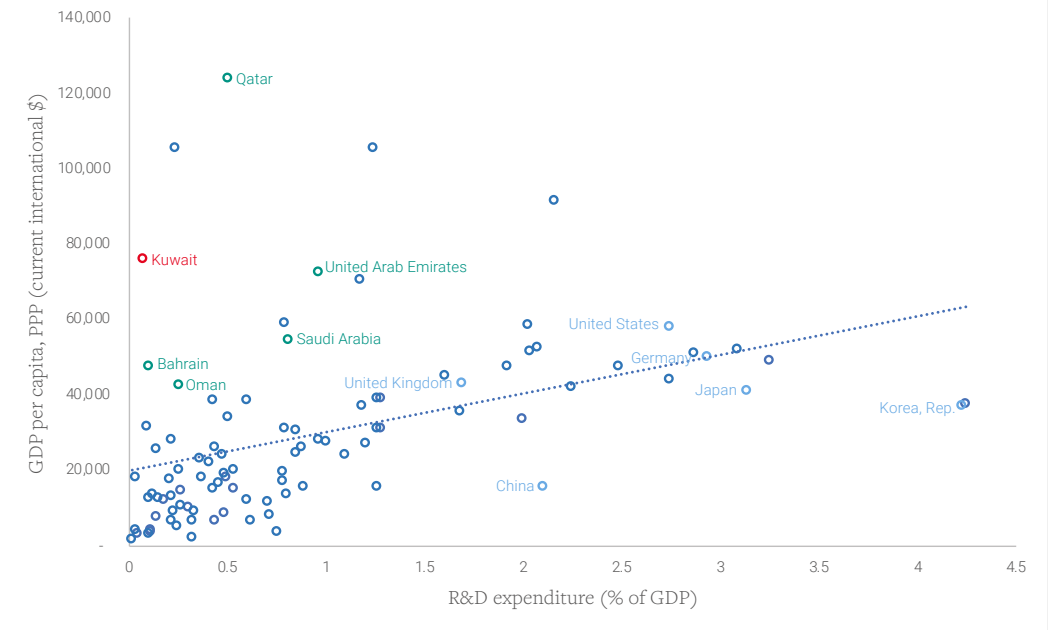
Abstract

Kuwait combines rich-world national income with the Research and Development (R&D) spending of a developing country. This situation is unsustainable. This report uses the National System of Innovation (NSI) framework to investigate how the Kuwaiti government could increase private sector R&D spending. Based on a review of the existing literature and data alongside a survey of large Kuwaiti firms, we find that few of the necessary and sufficient conditions for a functioning NSI are currently in place. The most important problem for private sector R&D in Kuwait is the general lack of skills and capabilities for innovation, which means that firms have few incentives to invest in risky, long term and skill intensive R&D activity. Future efforts to increase R&D by simply investing further in public R&D risks wasting money, without the adequate institutions, skills and framework conditions required to turn R&D into commercial success. Instead, we argue the Kuwaiti government should rethink the education system at all levels, implement a bottom-up diversification strategy, strengthen the Kuwaiti Information System and carry out a thorough governance review of innovation processes.

Introduction

Innovation, in its broader sense, is vital for economic performance. The best route to economic development and growth for middle-high income countries is to invest in the production of advanced products and processes, competing on the basis of innovation rather than standardised production. Countries which invest the most in systematic efforts to generate new knowledge – those with the highest R&D spending – tend to be the richest. The relationship between expenditure in innovation activities (proxied by R&D) and the level of income (GDP) per capita is undoubtedly positive: richer countries invest more, and few countries have managed to become well off with low levels of R&D (see Figure 1).

Figure 1 – Kuwait and Selected Countries: GDP per Capita vs. R&D Expenditure



Source: Authors' own elaboration on World Bank Indicators.
Notes: Country data for 2016.

The exception to this rule are the oil-rich states of the Gulf, of which Kuwait is the exemplar. Kuwait has the 6th highest GDP per capita in the world (in 2016), but private sector R&D is at the levels which would be expected in much poorer countries. Instead of relying on innovative activity to compete, the state is heavily reliant on oil revenues. For many Kuwaitis, oil wealth means that the economic system is somehow exempted from the need to invest in R&D and innovation activities more generally. More than 80 percent of government spending is funded by fossil fuel revenues, the 4th highest in the world.[1]

[1] Glenn-Marie Lange, Quentin Wodon and Kevin Carey (eds), 'The Changing Wealth of Nations 2018: Building a Sustainable Future', *World Bank* (Washington, DC, 2018). Available at https://openknowledge.worldbank.org/bitstream/handle/10986/29001/9781464810466.pdf?sequence=4&isAllowed=y (accessed 24 November 2019).

Yet it is highly unlikely that Kuwait's position will last. Apart from rapid increases in the global supply of oil due to new technologies and new sources including the prominent shale oil industry,[2] there are well-known technological, environmental, and socio-economic reasons why oil wealth is unlikely to sustain the high living standards currently enjoyed by Kuwaitis. Because of such transformations, there is a growing consensus amongst Kuwaiti policy-makers that the state needs to diversify its economy away from oil – and a realisation that innovation needs to be at the core of that evolution.

This is an important but difficult challenge. Long-standing research has shown that innovation is a socially-rooted, systemic and interactive process: it requires different actors, namely firms, large and small, domestic- and foreign-owned, universities and research and education systems, government agencies, etc., to work together. The National Systems of Innovation (NSI) perspective highlights the importance of a set of framework conditions, including demand for innovation, finance, skills, institutions, and social and cultural attitudes. But to enable such institutional and socio-economic change is challenging; oil wealth has meant that the Kuwaiti economy is in a sort of 'development trap' where incentives are locked in for activities to continue just as they are.

Importantly, spending on R&D is not, in itself, enough to create economic growth; in the literature on innovation and technical change, R&D is just the 'tip of the iceberg'. It is not simply a question of how much is spent in R&D, but rather of where and in which way investment in R&D is carried out, and how complementary innovative activities are integrated with such investment. In other words, it is not only a matter of quantity, but also of quality of R&D investments, and suitability for the local economy in order to ensure innovation creation and diffusion. In addition, in a country such as Kuwait in particular, the boundaries between the private and public sectors are fuzzy, with complex interconnections between the two spheres which shape the incentives of private firms and the extent to which they need to innovate to survive, and so need to be taken into account in priorities and policy design.

Aims, Scope and Methodology

This report has two primary aims:

To investigate the barriers to private sector R&D in Kuwait, and;

To consider ways in which those barriers might be overcome.

To achieve these aims, the methodology adopted consisted of a series of linked stages. First, we conducted a comprehensive literature review with the aim of identifying the necessary framework conditions which ought to be in place for substantial R&D investment to occur. This provided a framework to help understand the conditions through which innovation might happen. The second stage consisted of an assessment of Kuwait's NSI in the context

[2] Tokhir Mirzoev, Ling Zhu, Yang Yang, Tian Zhang, Erik Roos, Andrea Pescatori and Akito Matsumoto, 'The Future of Oil and Fiscal Sustainability in the GCC Region', *International Monetary Fund* (Washington, DC, 2020).

of the Gulf Cooperation Council (GCC) area, through the analysis of a wide set of data and indicators of the conditions identified as important in the literature.[3] We also mapped key institutions in the Kuwait NSI and conducted two focus groups with private sector firms and government or quasi-government agencies in January 2019. This gave us an understanding of how institutions in Kuwait matched the framework conditions we identified in our literature review. In the third stage, we carried out an original survey of 42 large firms in manufacturing industries likely to have different degrees of R&D intensity (over spring and summer 2019). We did this to assess more systematically how firms in Kuwait feel about R&D activity. Finally, we conducted a workshop in January 2020 where we tested and refined our findings, presenting the project to an audience of policy-makers and academics at an event hosted by the Kuwait Foundation for the Advancement of Sciences.

Structure of the Report

The report is structured as follows: section two outlines the literature on NSI and determinants and barriers of private sector R&D. It shows the need for a systemic approach to the study of innovation. Section three applies this to the specific situation of Kuwait within the GCC area and reviews the evidence on the enabling factors and barriers behind private sector R&D. Section four presents new evidence based on focus groups and an original survey of large manufacturing firms in Kuwait. Finally, section five provides a concluding assessment and outlines potential policy options.

Private Sector R&D and Long-Term Economic Development

This section reviews the theory and evidence of innovation systems in the scholarly literature. The NSI approach, which provides the conceptual and analytical framework for this report, is considered in its adaptation to the case of Kuwait. We then highlight the main implications derived from studies on the barriers to innovation for the purpose of our analysis.

Systems of Innovation: Key Concepts

The systems of innovation literature shows that innovation relies both on (1) the presence of actors (i.e. individuals, organisations and institutions), and (2) their dynamic interactions.[4] The relationships between individuals, organisations and institutions are aimed at facilitating knowledge exchange for the creation and diffusion of new ideas, solving coor-

[3] For reasons of space, the analysis of some of the indicators used to describe the Kuwaiti NSI is reported in the Appendix – Compendium to the Report.

[4] For example, see Christopher Freeman, *Technology Policy and Economic Performance: Lessons from Japan* (London: Pinter Publishers, 1987); Bengt-Åke Lundvall (ed.), *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning* (London: Pinter Publishers, 1992); Richard Nelson, *National Systems of Innovation: A Comparative Analysis* (New York: Oxford University Press, 1993).

dination problems and reducing the barriers to innovation.[5] Innovation is not simply a matter of firm level strategy, but also relates to inter-firm and inter-organisation networks, research, education and training systems, governance structures, policies, and, more generally, institutions and framework conditions such as adequate incentives to creativity, innovation and risk-taking attitudes.[6] In short, innovation is a systemic process. Without a functioning innovation system, firms have fewer incentives to invest in R&D and R&D is less likely to lead to successful market outcomes.

The conceptualisation of NSI has undergone numerous stages: from its original conception as a system of components and relationships, to a functional approach that also considers a number of sub-functions or activities that contribute to innovation.[7] However, when it comes to differences in structural and institutional features of economic systems – as, for example, in the case of emerging or developing countries or peripheral regions – the NSI conceptions do need to be adapted to a bottom-up and place-sensitive perspective, particularly when applied to contexts that lack, partially or wholly, some of the components, relationships and functions that a 'full' NSI is supposed to have.[8] When NSI's innovative performance is narrowly assessed in terms of macroeconomic performance, widespread policy practices have sought to maximise the amount of inputs to innovation instead of understanding how it takes place and is transformed into economic outcomes.[9] In this respect, through an evolutionary perspective, a NSI can instead be conceived as:

'[...] an open, evolving and complex system that encompasses relationships within and between organisations, institutions and socio-economic structures which determine the rate and direction of innovation and competence-building emanating from processes of science-based and experience-based learning.'[10]

This latter definition appears more relevant when studying socio-economic systems profoundly different from those in the 'iconic triad' in which the NSI concept was first developed, such as emerging and developing countries, as they have to be able to manipulate the pattern of economic coordination and specialisation that yields higher rates of learning capacity and competence-building. It also encompasses a broad definition of

[5] Erkko Autio and Llewellyn Thomas, 'Innovation Ecosystems', in Mark Dogson, David Gann and Nelson Phillip (eds), *The Oxford Handbook of Innovation Management* (Oxford: Oxford University Press, 2014), pp. 204–88.

[6] Simona Iammarino, 'An Evolutionary Integrated View of Regional Systems of Innovation: Concepts, Measures and Historical Perspectives', *European Planning Studies* 13/4 (2005), pp. 497–519.

[7] Riccardo Galli and Morris Teubal, 'Paradigmatic Shifts in National Innovation Systems' in Charles Edquist (ed.), *Systems of Innovation: Technologies, Institutions and Organization* (London: Pinter Publishers, 1997).

[8] Bengt-Åke Lundvall, K.J. Joseph, Cristina Chaminade and Jan Vang (eds), *Handbook of Innovation Systems and Developing Countries* (Northampton: Edward Elgar, 2009); Iammarino, 'An Evolutionary Integrated View of Regional Systems of Innovation: Concepts, Measures and Historical Perspectives'; Franz Tödtling and Michaela Trippl, 'Regional Innovation Policies for New Path Development: Beyond Neo-liberal and Traditional Systemic Views', *European Planning Studies* 26/9 (2018), pp. 1779–95, available at https://doi.org/10.1080/09654313.2018.1457140.

[9] Lundvall, Joseph, Chaminade and Vang (eds), *Handbook of Innovation Systems and Developing Countries*.

[10] Ibid.

innovation as it includes both science- and experience-based learning.[11] Furthermore, the set of socio-economic structures alluded to (and reported as crucial for development in the classic technological change literature[12]) include education and training, social policies that underpin social capital, as well as the functioning of the labour market, entrepreneurial attitudes and the organisation of firms.

Systems of Innovation: Context

Kuwait, as is true for other GCC countries, heavily depends on oil extraction. In 2017, whilst oil rents represented 37 percent of the country's GPD, oil exports amounted to 90 percent of total exports. The Arab Gulf States have all been affected by the 'natural resource curse' to different extents.[13] While oil provides wealth in the short- and medium-term, it may also hinder the economy's transition into the activities which are essential for long-term sustainable development and growth.

Kuwait is an exemplar of this problem: the World Bank estimates that in 2014 only 0.4 percent of Kuwait's GDP was spent on R&D, compared to a Middle East and North African average of 0.93 percent, and an OECD average of 2.4 percent. At the start of the 1990s, there was little participation in the transfer of technology to Kuwaiti firms, little training of the local workforce, a shortage of qualified engineers, no competition and low educational attainment of those acquiring foreign technologies.[14] At the turn of three decades, the situation does not appear to have changed substantially. Kuwait's R&D is almost entirely a function of the government and its related organisations; the business and the (mostly private) higher education sector did not perform R&D at all.[15] All this makes Kuwait an 'odd' case in the context of the official list of developing countries in which it is included; its level of economic wealth and infrastructural development clashes with the weakness of its NSI.[16]

The major challenge is moving away from an inherited prosperity model, which is limited by natural resources and has government as the central actor, towards a prosperity that builds on the innovative capacity and value added of individuals and firms and where the government facilitates the enabling conditions.[17] The institutions stim-

[11] Morten Berg Jensen, Björn Johnson, Edward Lorenz and Bengt-Åke Lundvall, 'Forms of Knowledge and Modes of Innovation', *Research Policy* 36/5 (2007), pp. 680–93. Available at https://doi.org/10.1016/j.respol.2007.01.006.

[12] For example, Carlota Perez, 'Microelectronics, Long Waves and World Structural Change: New Perspectives for Developing Countries', *World Development* 13/3 (1985), pp. 441–63.

[13] Jeffrey Sachs and Andrew Warner, 'Natural Resources and Economic Development: The Curse of Natural Resources', *European Economic Review* 45 (2001), pp. 827–38.

[14] Salahaldeen Al-Ali , 'Technological Dependence in Developing Countries: A Case Study of Kuwait', Technology in Society 13/3 (1991), pp. 267–77. Available at https://doi.org/10.1016/0160-791X(91)90003-F.

[15] Steffen Gackstatter, Maxim Kotzemir and Dirk Meissner, 'Building an Innovation-Driven Economy - The Case of BRIC and GCC Countries', *Foresight* 16/4 (2014), pp. 293–308. Available at https://doi.org/10.1108/FS-09-2012-0063.

[16] 'OECD Reviews of Innovation Policy: Kuwait – Overall Assessment and Recommendations', *OECD* (Paris, 2019).

[17] Michael Porter, 'Competitiveness and Economic Development of Gulf and Middle Eastern Countries', Middle East Petrotech (Bahrain, September 2003), pp. 1–23.

ulating interaction between actors in NSIs are among the key factors that determine whether natural resources are a blessing or a curse.[18] The challenge GCC economies face today may provide the opportunity to be frontrunners in identifying solutions to address the natural resource curse.

Barriers to R&D and Innovation in Kuwait and in the GCC

Building and maintaining a knowledge base is a complex and difficult undertaking, and itself only one step towards building a genuine NSI.[19] Rentier bargains continue to underpin the socio-political and economic arenas of Gulf states, and, as such, there are structural conditions that hinder the ability of states to effectively build knowledge bases and complete NSIs.[20] A major problem GCC countries face is that existing workforce skill levels are low by world standards.[21] A deficient education system and the large share of unskilled and semi-skilled foreign workers (and the complementary lack of foreign high-skilled) are serious deterrents to the implementation of strategies to reduce dependence on foreign technologies and oil exports.[22]

Kuwait's aspirations for an effective NSI require the recognition, agency and action of its civil society, citizens and foreign residents. However, such developments are hindered by the reality that these features are largely absent from the country's education system. Firstly, a largely segregated schooling system and a curriculum that both conflates nationalistic values over cultural diversity, and promotes compliance over critical thinking, tends to preserve the current balance of power and undermine Kuwait's democratic, diversified and knowledge-based development.[23] The current education systems by and large do not prepare the students adequately for further study or employment, particularly in R&D intensive sectors.[24]

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[18] Bjørnar Sæther, Arne Isaksen and Asbjørn Karlsen, 'Innovation by Co-Evolution in Natural Resource Industries: The Norwegian Experience', *Geoforum* 42/3 (2011), pp. 373–381.

[19] Ian Brinkley, Will Hutton, Philippe Schneider and Kristian Ulrichsen, 'Kuwait and the Knowledge Economy', *The Work Foundation and the Kuwait Programme on Development, Governance and Globalisation in the Gulf States* (London, 2012); Gackstatter, Kotzemir and Meissner, 'Building an Innovation-Driven Economy - The Case of BRIC and GCC Countries'; Shu-guang Liu and Cai Chen, 'Regional Innovation System: Theoretical Approach and Empirical Study of China', *Chinese Geographical Science* 13/3 (2003), 193–8, available at https://doi.org/10.1007/s11769-003-0016-5.

[20] Dwaa Osman, 'The State and Innovation - An Analytical Framework', *Muslim World* 105/1 (2015), pp. 2–23. Available at https://doi.org/10.1111/muwo.12077.

[21] Nicholas Davis and Chiemi Hayashi, 'The Gulf Cooperation Council (GCC) Countries and the World: Scenarios to 2025', *World Scenario Series*, World Economic Forum (Geneva, January 2007).

[22] Joan Muysken and Samia Nour, 'Deficiencies in Education and Poor Prospects for Economic Growth in the Gulf Countries: The Case of the UAE', *Journal of Development Studies* 42/6 (2006), pp. 957–80. Available at https://doi.org/10.1080/00220380600774756.

[23] Rania Al-Nakib, 'Education and Democratic Development in Kuwait: Citizens in Waiting', Chatham House (London, 2015); Alan Weber, 'The Role of Education in Knowledge Economies in Developing Countries', *Procedia - Social and Behavioral Sciences* 15 (2011), pp. 2589–94, available at https://doi.org/10.1016/j.sbspro.2011.04.151.

[24] Martin Hvidt, 'The State and the Knowledge Economy in the Gulf: Structural and Motivational Challenges', *Muslim World* 105/1 (2015), pp. 24–45. Available at https://doi.org/10.1111/muwo.12078.

While there are multiple research institutions, there are few incentives for the private sector to engage in R&D and commercialise research.[25] Initiatives to spur R&D by establishing dedicated research centres, such as KISR, have had success in specific research areas. These centres are mainly populated by foreign researchers, however, and are insufficient in relation to the huge task of providing an adequate base for the supply side of R&D; the availability of local researchers and PhD students is very limited; and collaboration between research institutes, industry and the government to facilitate knowledge sharing and commercialisation is weak.[26] The limited commercialisation is also partly due to the status of intellectual property (IP) laws in the GCC region, which have been defined as lax and as lacking enforcement.[27]

Kuwaiti citizens working in comfortable positions in the public sector have little incentive to champion policies that promote the private sector, in contrast to the relatively poorer GCC countries (Bahrain, Saudi Arabia, and Oman), where the private sector is a larger employer.[28] Kuwaiti nationals, like others in the Gulf, are guaranteed public sector employment with higher salaries, in addition to better working conditions, than what is offered by the private sector. This sharp dichotomy between the public and private sectors distorts motivations to pursue higher education.[29]

Public sector wages thus set what economists call a 'reservation wage' and citizens in Kuwait, the UAE and Qatar rarely work for less. It is not surprising that the business sector has little incentive to employ citizens; this is especially true for those with fewer skills. Expatriate wages in the private sector, for all but the most skilled labour, are well below the level paid to citizens in the public sector.[30] These labour market features provide no incentives for organisations to invest in transferring knowledge to nationals,[31] and hamper risk-taking private ventures such as entrepreneurship that generate value added.[32]

More generally, it has been put forward that the failure of GCC societies to develop technological and institutional capabilities to foster innovation is primarily due to their 'rent-dominated' political cultures.[33] Kuwait holds generally free and fair parliamentary

[25] Steffen Hertog, 'State and Private Sector in the GCC after the Arab Uprisings', *Journal of Arabian Studies* 3/2 (2013), pp. 174–95. Available at https://doi.org/10.1080/21534764.2013.863678.

[26] Brinkley, Hutton, Schneider and Ulrichsen, 'Kuwait and the Knowledge Economy'.

[27] Dwaa Osman, 'The State and Innovation - An Analytical Framework', *Muslim World* 105/1 (2015), pp. 2–23. Available at https://doi.org/10.1111/muwo.12077.

[28] Michael Herb, 'A Nation of Bureaucrats: Political Participation and Economic Diversification in Kuwait and the United Arab Emirates', *International Journal of Middle East Studies* 41/3 (2009), pp. 375–95. Available at https://doi.org/10.1017/S0020743809091119.

[29] Osman, 'The State and Innovation - An Analytical Framework'.

[30] Ugo Fasano-Filho and Rishi Goyal, 'Emerging Strains in GCC Labor Markets', *IMF Working Papers* 4 (Washington, DC, 2004). Available at https://doi.org/10.5089/9781451849271.001.

[31] Zamila Bunglawala, 'Young, Educated and Dependent on the Public Sector: Meeting Graduates' Aspirations and Diversifying Employment in Qatar and the UAE', *Brookings Doha Center* (Doha, 2011).

[32] Steffen Hertog, 'The Sociology of the Gulf Rentier Systems: Societies of Intermediaries', *Comparative Studies in Society and History* 52/2 (2010), pp. 282–318. Available at https://doi.org/10.1017/S0010417510000058.

[33] A.B. Zahlan, 'Arab Societies as Knowledge Societies', *Minerva* 44/1 2006, pp. 103–12. Available at https://doi.org/10.1007/s11024-005-5404-9.

elections with near universal adult suffrage for citizens. Its parliament is the strongest in the Gulf and among the strongest in the Arab world.[34] At the heart of parliament's power lies the ability of a majority of the elected members to be able to express a vote of no confidence in individual ministers. However, this structure tends to have the opposite effect of leading to political deadlock, and to paralysis of large-scale projects that would benefit the whole economy.[35]

Finally, international flows of foreign direct investment (FDI) and talent are crucial for economic growth and for the development of a strong knowledge base. Kuwait badly lags behind the UAE, and all other Gulf states, in FDI. Foreign firms in Kuwait consistently complain that it is a more difficult and less profitable place to do business than its neighbours in the Gulf, in particular Dubai.[36] GCC countries heavily rely on highly qualified foreign workers. However, while attractive pay may attract foreigners, knowledge workers are also motivated by other sets of incentives and culturally more open environments.[37] The rigid labour and migration policies in Kuwait create obstacles to recruiting and retaining talent, transferring knowledge and facilitating the contribution of high skilled foreigners to knowledge creation and innovation.[38]

The Kuwaiti Innovation System

This report is based on an in-depth and detailed analysis of all the main features of the Kuwaiti national economic and innovation system, and their evolution over time. We considered macroeconomic fundamentals, industry structure in terms of sectoral composition, industry dynamics, firm size and ownership (i.e. public versus private), trade and international specialisation in terms of both exports and imports, inward and outward FDI, various labour markets aspects, institutional quality, and innovation-related indicators. The data used for the analysis came from various official sources, including the World Bank, the Kuwait Central Statistical Bureau (Annual Survey of Establishments), the World Economic Forum (Global Competitiveness Index), and the Financial Times fDi Market. While we tried to build up as a comprehensive picture of the Kuwaiti NSI as possible, it should be noted that key indicators were often unavailable or, as in the case of R&D investment, unreliable.

For the sake of space, we present below only the features strictly connected with innovation indicators. The analysis presented in the report also makes reference to the Appendix which forms the Compendium to the Report.

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[34] Michael Herb, 'The Origins of Kuwait's National Assembly', *LSE Kuwait Programme Paper Series* 39 (London, 2016). Available from http://eprints.lse.ac.uk/65693/1/39_MichaelHerb.pdf.

[35] Michael Herb, 'A Nation of Bureaucrats: Political Participation and Economic Diversification in Kuwait and the United Arab Emirates'; Osman, 'The State and Innovation - An Analytical Framework'.

[36] Herb, 'A Nation of Bureaucrats: Political Participation and Economic Diversification in Kuwait and the United Arab Emirates'.

[37] Brinkley, Hutton, Schneider and Ulrichsen, 'Kuwait and the Knowledge Economy'.

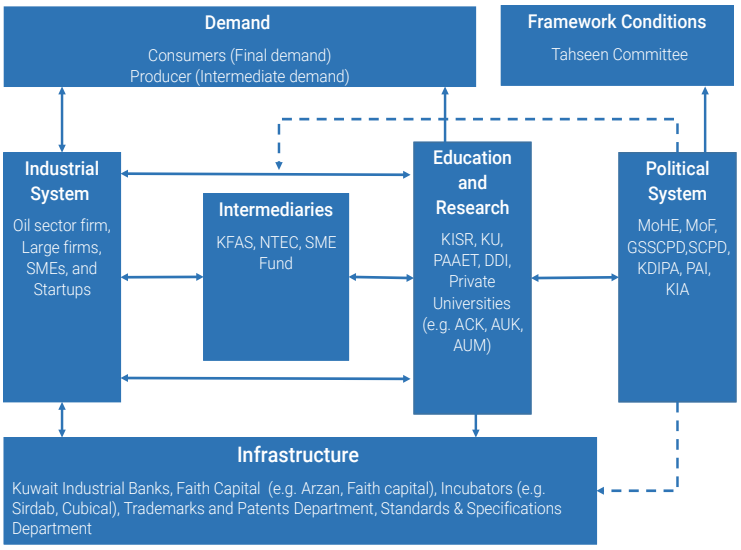
[38] Osman, 'The State and Innovation - An Analytical Framework'.

Main Science, Technology and Innovation (STI) Actors in Kuwait

The Kuwait NSI displays a configuration in which the government is the gravitational centre around which university and industry rotate in a Triple Helix terminology (see Figure 2).[39]

The government has direct control of STI through its arms represented by the highly influential Ministry of Finance (MoF) that approves all the budgets allocated to research and leaves very little autonomy to STI institutes. The Ministry of Higher Education (MoHE) is the governing body of the main players on the supply side, and this includes the Kuwait Institute for Scientific Research (KISR), Kuwait University (KU) and the Public Authority for Applied Education and Training (PAAET). Private universities are also governed by the General Secretariat of Private Universities Council, a government body led by the Minister of Higher Education, who is also the Chair of the Board of Trustees of KISR.

Figure 2 – Kuwait's NSI



Note: Adapted from Kuhlmann and Arnold (2001)

With the lack of a central body to guide STI strategies, the General Secretariat of the Supreme Council for Planning and Development (GSSCPD) and the Kuwait Foundation for the Advancement of Sciences (KFAS) endeavour to coordinate and mobilise public and private resources to make progress in STI to contribute to the diversification agenda.

GSSCPD is the central government body that is responsible for leading the country's planning process as mandated by Amiri Decree No. 33 in 2004, and it reports to Supreme

[39] Henry Etzkowitz and Chunyan Zhou, *The Triple Helix: University–Industry–Government Innovation and Entrepreneurship* (London: Routledge, 2017).

Council for Planning and Development (SCPD). New research centres have been established as part of GSSCPD's effort to improve the quality of the national development plans, such as the Kuwait Public Policy Centre (KPPC), the National Development Research Centre (NDRC) and the National Observatory for Sustainable Economy Centre.

SCPD is chaired by his Highness the Prime Minister or his Delegate, and its membership includes the Deputy Prime Minister and Foreign Minister, the Minister of State for Cabinet Affairs, the Governor of the Central Bank of Kuwait, representatives from the private sector and civil society organisations, and various other ministries.

The establishment of the Kuwait Direct Investment Promotion Authority (KDIPA) in 2013 under the Ministry of Commerce and Industry was timely, since one of its key functions is a 'promotional role' (as described by KDIPA) which aims to leverage the potential of innovation based inward FDI into Kuwait for the purpose of enhancing technology transfer.

The Public Authority for Industry (PAI) is leading the development of a new industrial policy and it has embarked on extensive initiatives to establish science and technology parks involving the private sector, whilst the Kuwait Authority for Partnership Projects (KAPP) has the mandate to facilitate public-private partnerships.

The Kuwait Investment Agency (KIA), which is the world's first and oldest sovereign wealth fund, is responsible for managing local and foreign investment. With respect to supporting STI, the National Technology Enterprises Company (NTEC) was established in 2002 by the Kuwait Council of Ministers as a fully owned subsidiary of the KIA with the purpose of transferring technology and know-how locally by investing in foreign high-tech firms.

In addition to its effort to promote STI culture in Kuwaiti society, KFAS is directly managing a few research institutes such as the Dasman Diabetes Institute (DDI) and the Jaber Al Ahmad Centre for Nuclear Medicine and Molecular Imaging. KFAS is also leading important community-based work through the Sabah Al Ahmad Centre for Giftedness and Creativity (SACGC), which aims to nurture Kuwaiti talents and support individual inventors.

Although the government has shown interest in innovation-driven development strategies, this has not been fully reflected in the rolling Kuwait national development plans. There is a lack of specific innovation targets, for example to clarify the role of innovation in processes of economic diversification, and a fragmented governance structure which hinders clear task assignment and responsibility. Providing generous budgets to public research and academic institutions in addition to engaging large firms to fund KFAS is not enough to promote R&D and innovation in the private sector.

The non-business providers of innovation, represented by a few research institutes and universities led mainly by KISR and KU, create most of the knowledge base for the NSI. Both of these organisations have tried to address the gap of commercialisation by establishing dedicated organisational units. KISR has the mandate to conduct applied research with a special emphasis on petroleum studies, water, energy, and the environment, which

are aligned with the enduring national challenges. KISR's research budget in 2017/2018 was KD 53.3 million, while Kuwait University's research budget was only KD 4 million in the same fiscal year.[40] This confirms firms' perceptions that local universities, including private ones, are largely teaching institutions and research activities remain weak. However, recent new initiatives to promote R&D have been launched in KU and private universities such as the Gulf University for Science and Technology (GUST) and the American University of Kuwait (AUK). For instance, GUST has introduced new internal research grants and the load of teaching for staff is reduced if they publish in high rank journals.

Kuwait in Context: Kuwait Compared to Other GCC Countries

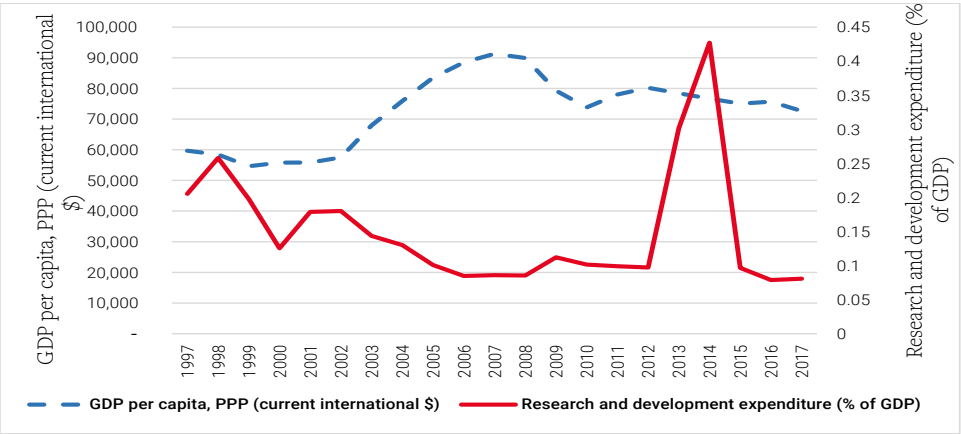
R&D Expenditure

As discussed in Section 2, R&D represents only the 'tip of the iceberg' and can by no means occur without important pre-conditions. Not surprisingly, little R&D and innovation is occurring in the GCC region.[41] The relative expenditure on R&D is low by international standards, averaging 0.15 percent of Kuwait's GDP over a 20-year period, reaching a peak of 0.42 between 2012 and 2015, although this rise was due to reporting and statistical issues rather than a genuine increase (see Figure 3). Within the Gulf area (see Figure 4), in 2018, none of the GCC countries exceeded one percent: the UAE is the closest, followed by Saudi Arabia (0.8), Qatar (0.5), Oman (0.2), Bahrain (0.1) and, in last position, Kuwait with 0.08 percent of GDP.

[40] 'OECD Reviews of Innovation Policy: Kuwait – Overall Assessment and Recommendations', *OECD* (Paris, 2019).

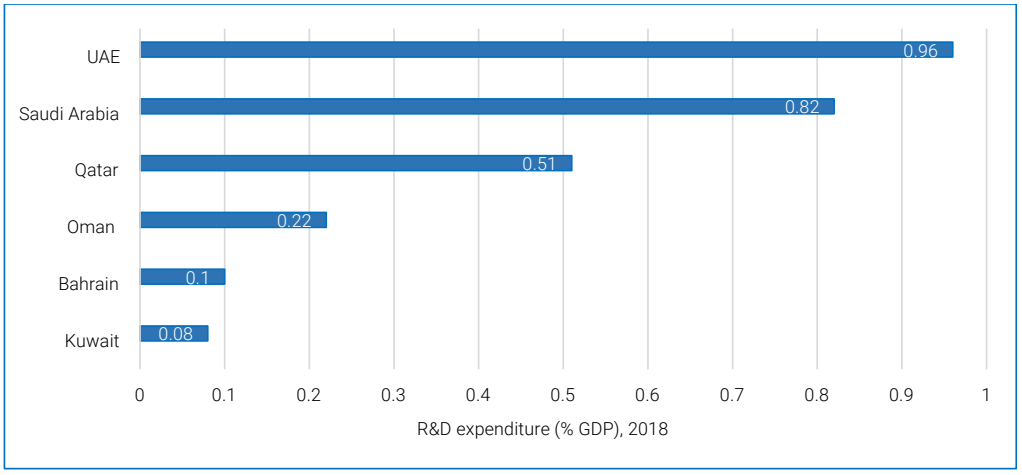
[41] Davis and Hayashi, 'The Gulf Cooperation Council (GCC) Countries and the World: Scenarios to 2025'.

Figure 3 – Kuwait: GDP per Capita vs. R&D Expenditure



Source: Authors' own elaboration on World Bank Indicators

Figure 4 – GCC: R&D as a Percentage of GDP



Source: Authors' own elaboration on World Bank Indicators

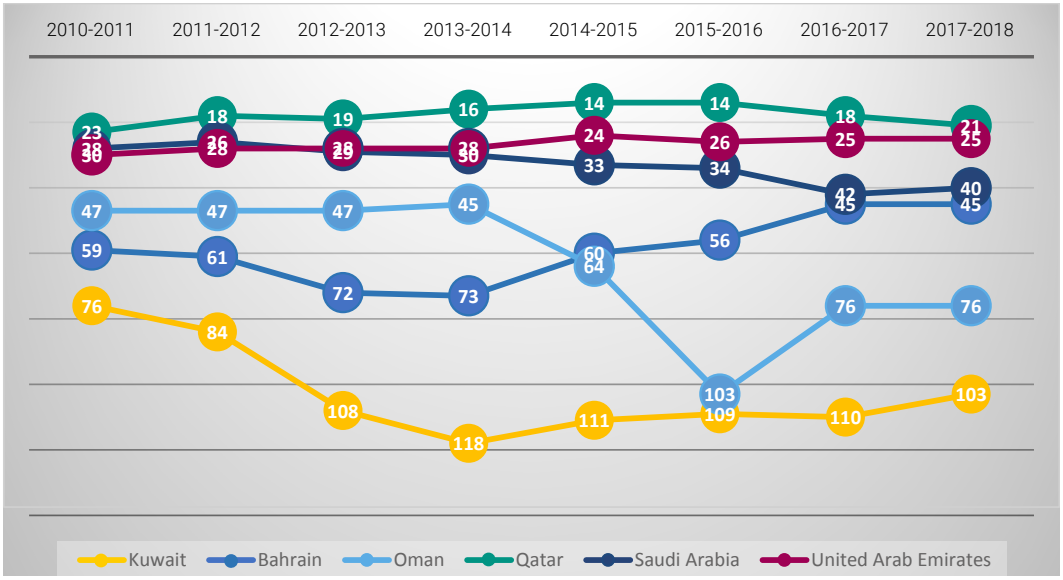
Innovation Performance

A more comprehensive measure of innovation is the 'Innovation pillar' of the Global Competitiveness Index (GCI) since it captures several dimensions related to firms' perceptions - and other more tangible measures - of innovative activities in the country they operate in. The subcomponents of this pillar (except patent applications) are gathered from the Executive Opinion Survey of the GCI which is the longest-running and most extensive survey of its kind; in the 2017 edition, 14,375 business executives in over 148 economies were surveyed. It has been argued that there may be differences in the way executives and employees perceive the economic environment in which they

operate which may bias the survey responses,[42] thus failing to reflect the reality of participant countries.[43] Nonetheless, this survey captures the opinions of business leaders around the world on a range of topics for which statistics are unreliable, outdated, or non-existent in many countries.[44] Therefore, the Innovation pillar constitutes a good proxy for innovative conditions.

Considering this component of the GCI indicator during the 2010s, Kuwait lags well behind the rest of the GCC area, falling sharply in the ranking for the Innovation pillar of the GCI between 2010 and 2014 (see Figure 5). Qatar and the UAE lead in the region with high and relatively stable ranks, followed by Saudi Arabia. A notable virtuous trajectory is that of Bahrain that advanced 14 positions in the global ranking.

Figure 5 – GCC: GCI Innovation Pillar



Source: Authors' own elaboration on The Global Competitiveness Index Historical Dataset © 2007-2017 World Economic Forum | Version 20171003. Notes: World ranking; the component is a weighted average of seven subcomponents.

In as much as the GCI captures the perceptions of those running businesses, the main subcomponents of the Innovation pillar show that Kuwait is struggling to achieve any significant improvement in the period 2010–2018, except for minor progress in 'Company spending on R&D' and 'Government procurement of advanced technology products' (see Table 1).[45]

[42] Edgar Soto-Rodríguez & Edgar Maíz-Vázquez, 'Implications of Including Non-Executives' Perception in the Executive Opinion Survey: A Hierarchical Bias Effect in the Global Competitive Index', *Journal of Marketing Development and Competitiveness* 10/2 (2016), pp. 68–80.

[43] Sanjaya Lall, 'Competitiveness Indices and Developing Countries: An Economic Evaluation of the Global Competitiveness Report', World Development 29(9) (2001), pp. 1501–25. Available at https://doi.org/10.1016/S0305-750X(01)00051-1.

[44] 'The Global Competitiveness Report 2017-2018', *World Economic Forum* (Geneva, 2018).

[45] Subcomponents 1 through 6 are the weighted average of the survey responses to the relevant questions. For example, in the first subcomponent the question reads: In your country, to what extent do companies have the capacity to innovate? Answers range from 1 = not at all to 7 = to a great extent.

Table 1 – Kuwait's Rank in the Subcomponents of the GCI Innovation Pillar

Indicator	Rank in 2019	Rank in 2018
1. Capacity for innovation	97	102
2. Quality of scientific research institutions	75	97
3. Company spending on R&D	116	102
4. University-industry collaboration in R&D	96	108
5. Gov't procurement of advanced technology products	90	84
6. Availability of scientists and engineers	57	98
7. PCT patent applications	79	85

Source: Authors' own elaboration on The GCI Historical Dataset © 2007-2017 World Economic Forum

In all subcomponents of the Innovation pillar without exceptions (see Figures A1-A7 and A10, A11, A16 in the Appendix), Kuwait ranks last among its GCC neighbours. For example, 'Company spending on R&D' (Figure A3) is a good proxy of private R&D, due to the lack of official comparable data. Kuwait lags behind all GCC countries despite a recent small improvement in its world ranking from 115 to 102. Considerable advances are recorded in Oman and, to a lesser extent, in Saudi Arabia; the indicator of private R&D falls for Qatar and Bahrain, whilst the UAE remains roughly in the same position.

Also 'University-industry collaborations in R&D' (Figure A5) are perceived to be the weakest in Kuwait and Bahrain, but the latter records considerable improvement over time; the rest of the GCC countries maintain by and large the same relative positions, with Qatar and the UAE leading within the group.

Another important bottleneck facing GCC countries, as discussed above, is the presence of high-skilled individuals. Once more, 'Availability of scientists and engineers' (Figure A6) is the lowest in Kuwait and Oman, whilst it ranks highest in the UAE and Qatar, both of which are among the top 10 globally. Importantly, Kuwait is not just performing poorly by this measure, but it is also in rapid decline: between 2010 and 2018, Kuwait fell 41 places on this indicator.

In terms of innovation output, there are smaller differences among GCC countries. 'PCT patents applications' (Figure A7) per million population are the lowest in Kuwait followed closely by Oman. However, when analysing the growth of number of patents in absolute terms using raw data from WIPO's statistics database (Figure A8), Kuwait shows considerable progress; while only 64 patents were granted in 2007, this number increased to 521 in 2017, placing Kuwait ahead of Qatar, Bahrain and Oman.

Knowledge Transfer

Although technological capabilities of GCCs have incrementally increased over time, the region as a whole heavily relies on more advanced countries for technology transfer.[46] The indicator of 'FDI and technology transfer'[47] (Figure A10) captures firms' perceptions of the extent to which FDI brings new technologies into the host economy. This reliance on foreign technologies is evident for the UAE that not only ranks the highest within the GCC, but also globally (4th worldwide). Foreign technology transfer is also significant for Saudi Arabia and Bahrain; Oman and Kuwait in particular score significantly low in this indicator, both among the GCC and worldwide.

On the other hand, the successful adoption of foreign know-how and technology requires domestic firms to develop the necessary technological capabilities to use and adapt new technologies, as proxied by the GCI subcomponent of 'Firm-level technology absorption'[48] (Figure A11). The best ranked firm absorptive capacity is found in the UAE and Qatar, followed by Saudi Arabia and Bahrain. Again, Kuwait is positioned at the bottom end with a rapidly deteriorating relative position.

Education, Training and Academic Performance

As discussed above, GCC countries face a major development constraint in that existing workforce skill levels are low by world standards, as also shown by the most recent World Bank Indicators compared to 2018 (Figures A12–A15 in the Appendix). This is partially reflected in the low educational attainment of the population aged 25 and above. Overall, Kuwait lags considerably behind its GCC neighbours; with some nuances, the UAE, Saudi Arabia and Qatar are in the upper part of the distribution, whilst Oman, Bahrain and Kuwait are at the bottom. It is worth highlighting that educational attainment for Kuwaitis is consistently higher for females than males.

Beyond the formal education system, technical and vocational training systems are crucially important sources of skills, and strongly complementary to formal education.[49] This type of educational attainment is captured in the short-cycle tertiary education indicator (Figure A15). In Kuwait, 8.5 percent of males and 11.2 of females completed this level in 2018. These figures are much higher for the UAE, Saudi Arabia and Bahrain. Moreover, the indicator of 'Local availability of specialised training services'[50] (Figure A16) is the lowest in Kuwait of all GCC states.

Finally, considering country comparisons[51] on student academic performance in the 4th

[46] Chun-Yao Tseng, 'Technological Innovation Capability, Knowledge Sourcing and Collaborative Innovation in Gulf Cooperation Council Countries', *Innovation* 16/2 (2014), pp. 212–23.

[47] This subcomponent is part of the GCI's 9th pillar that pertains to technological readiness.

[48] Ibid.

[49] For example: Andrea Filippetti, Frederick Guy and Simona Iammarino, 'Regional Disparities in the Effect of Training on Employment', *Regional Studies* 53/2 (2019), pp. 217–30; James Heckman, 'Doing It Right: Job Training and Education', *Public Interest* 135 (1999), p. 86–107.

[50] This subcomponent is part of the GCI's 5th pillar, which pertains to higher education and training.

[51] Data is taken from TIMSS (Trends in International Mathematics and Science Study) and PIRLS (Progress in International Reading Literacy Study) conducted by the International Study Center, Boston College.

grade (Figures A17-A18), all GCC countries are considerably low in the international distribution of scores in Reading, Mathematics and Science, but Kuwait underperforms in all three categories compared to GCC countries. In Mathematics and Science, the performance of 4th graders in Kuwait worsened between 2011 and 2015.

Barriers to Private Sector R&D in Kuwait: New Evidence

The Kuwait PAI reported that the total expenditure on R&D and research in general in 2013 amounted to about KD 14.5 million; ten million was invested by state-owned enterprises and only two million by privately-owned manufacturing firms.[52] The oil sector had the lion's share of about KD twelve million and continued to dominate all aspects of the Kuwaiti economy. The other two million Kuwaiti Dinars were mainly invested in the food industry (KD 1.3 million) and metal and equipment (KD 0.5 million), while the residual was spread among all other industries. This modest figure highlights the severity of the problem, in particular with reference to the firms which are 100 percent privately owned. According to PAI, the overriding obstacle is the difficulty in technology acquisition and its associated cost.[53] The recent OECD review of innovation policy in Kuwait[54] shows that business expenditure for R&D in Kuwait is in the range of KD 15–30 million, meaning it increased only marginally from its 2013 level.

The proceeding section presents new evidence on the barriers to R&D investment faced by the business sector in Kuwait, gathered through an original survey of large Kuwaiti manufacturing firms. We focused on large firms because they are an extremely important part of Kuwait's economy[55] and the most innovative.[56]

Survey Methodology

Since we are studying R&D, our survey focused on the manufacturing sector as the part of the economy where R&D is most often conducted. We also focused on firms with more than 249 employees as these are likely to be most R&D active. Achieving a large enough sample was a challenge, however. Our initial sample frame was all 90 large manufacturing firms included in the Public Authority for Industry database for 2018. Of these, 22 firms responded (24.4% of the sample). We then contacted a second set of firms based on a private database owned by the survey house which conducted the survey. Of these, 50 firms responded but, after checks, only 20 of these fulfilled our core size and sectoral criteria. The final sample consists of 42 large firms in manufacturing industries. While this is not large, such samples are not uncommon for work on large R&D intensive firms. The firms operated in a variety of manufacturing industries as shown in Table A1 of the Appendix .

[52] Abdulkarim Taqi, 'Kuwait Industry Forum', *Kuwait Public Authority of Industry* (Kuwait City, 2019).
[53] Ibid.
[54] 'OECD Reviews of Innovation Policy: Kuwait – Overall Assessment and Recommendations', *OECD*.
[55] 'An Assessment of Private Investment Behavior in Kuwait', *KISR* (Kuwait City, 2018).
[56] 'Kuwait Enterprise Innovation Assessment Survey (2013-2015)', *KISR* (Kuwait City, 2017); 'OECD Reviews of Innovation Policy: Kuwait – Overall Assessment and Recommendations', *OECD*.

Where possible, interviews were conducted face-to-face as we felt this would allow the most nuanced responses. Many firms were unwilling to meet in person, however, so we also offered telephone interviews or an online option. More than 40% of the firms accepted face-to-face contact and each interview lasted for an average of one hour; the rest opted for phone interviews. Most interviewees were senior managers. Participant firms were asked if they were willing to be involved in more in-depth conversations to elaborate beyond the planned discussion points, and six firms accepted. These in-depth interviews generated additional qualitative data and provided further insights.

The full survey was designed to reflect the Oslo manual guidelines where possible. We asked a range of questions about the background of the firms and their R&D activity. The full survey is included in the Appendix. Here we present a narrative of the most relevant points that emerged from the survey and in-depth interviews along with other information gathered in the focus group sessions conducted prior to the survey.

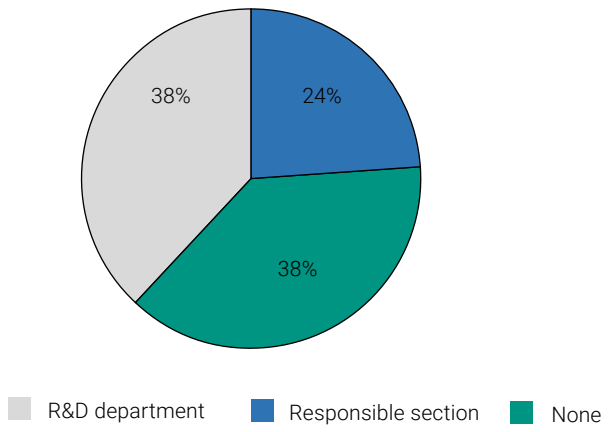
R&D Activity in Large Kuwaiti Manufacturing Firms

Most of the firms we interviewed (78 percent) started to conduct internal R&D activities in the three years prior to the survey. This might be surprising when compared to the results from the Kuwait innovation survey conducted in 2017,[57] which showed that only 9.3 percent of firms invested in R&D. However, 93 percent of the KISR sample were micro, small, and medium-sized enterprises while ours was deliberately focused on large manufacturing firms expected to be involved in R&D.

About a third of the R&D-active firms refused to report the amount of R&D expenditures. Among those that did report the figures, only four declared an annual R&D budget of KD 100,000 (around 300,000 Euros) and above. Less than 5 percent of firms have more than 20 R&D staff, and less than 20 percent reported technological innovation as a result of in-house R&D operations. More than one third of the interviewed firms do not have a dedicated department or organisational units to handle R&D and innovation activities (see Figure 6). This is attributed to the lack of skills to conduct R&D management and the weak organisational setting, even in large firms. While large firms are conducting R&D, they do not seem to be doing so on a large scale, and few are producing significant innovations.

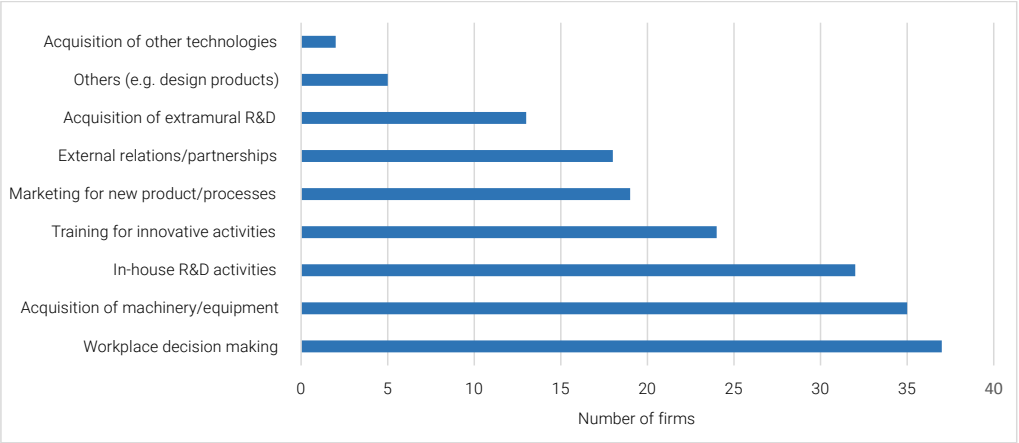
[57] Ibid.

Figure 6 – Percentage of Firms with R&D Organisational Units (N=42)



Most firms seem to be risk-averse and do not invest in new or emerging technologies; apart from in-house R&D, the top innovation activities include acquisition of machinery and equipment, and investing in strategies and training activities (Figure 7). Only two firms stated they had purchased IPs.

Figure 7 – Types of Innovation Activities (N=42)



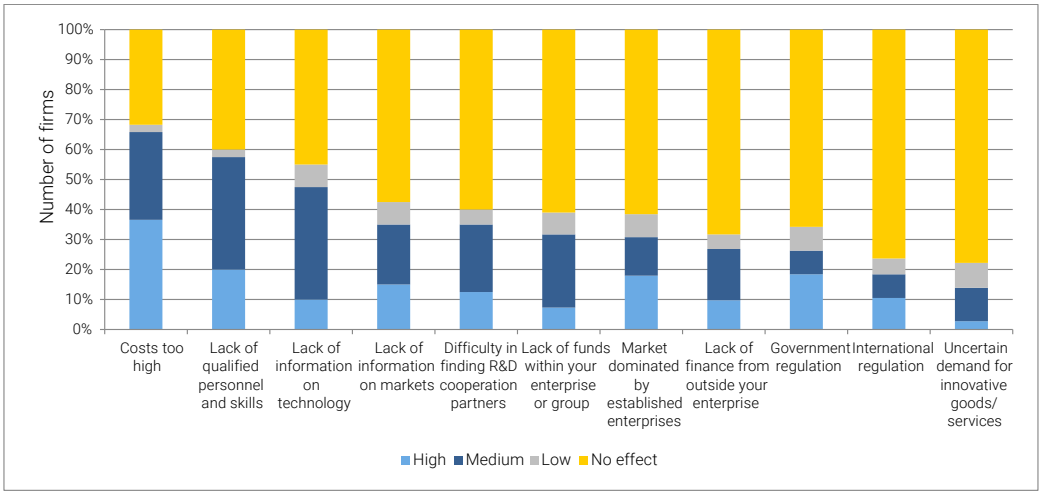
Barriers to R&D

The top barrier encountered by R&D-active interviewed firms is the cost being too high (Figure 8). The relevance of financial obstacles is usually highlighted in similar surveys in both developed and developing countries, and represents a major obstacle also in a resource-rich country like Kuwait.[58] This might not, of course, be due to a lack of internal

[58] These findings are in line with the Kuwait Innovation Survey in which 43 percent of firms declared they were hampered by high costs, 42 percent indicated a lack of funds within the enterprises or group,

finance but rather because the expected returns from these investments are too low.

Figure 8 – Obstacles Hampering Innovation Activities



However, in line with recent empirical studies on European countries,[59] the issue goes well beyond financial constraints. KFAS has offered several programmes to sponsor private sector R&D activities over the last five years, and most firms were not able to take advantage of them: only one company stated they had benefited from the innovation schemes. In one of the stakeholder engagement sessions (focus groups), a KFAS representative openly supported this view:

'The issue is not money, rather the lack of qualified staff who can conduct and manage firms' R&D activities.'

Indeed, the 'lack of qualified personnel and skills' ranked second among our interviewees, and it is consistent with the often low percentage of employees with STI relevant skills declared by the surveyed firms. One cause of this might be a weaker STEM subject education in Kuwaiti schools which then influences university choices.[60]

In the focus group conducted with key innovation actors, R&D funding agencies and research organisations suggested education was a problem. One of these actors from the supply side claimed that:

and 35 percent had a lack of funds from outside. See 'Kuwait Enterprise Innovation Assessment Survey (2013-2015)', *KISR*.

[59] Pablo D'Este, Frederick Guy and Simona Iammarino, 'Shaping the Formation of University–Industry Research Collaborations: What Type of Proximity Does Really Matter?', *Journal of Economic Geography* 13/4 (2013), pp. 537–58; Simona Iammarino, Tiziana Sodano and Giovanni Vittorino, 'Firms; Perceptions of Barriers to Innovation and Resilience: The Italian Region of Friuli Venezia Giulia During the Crisis', *Scienze Regionali: Italian Journal of Regional Science*, (2020), pp. 25–54.

[60] Alexander W. Wiseman, Faisal A. Abdelfattah, and Ahmad Almassaad, 'The Intersection of Citizenship Status, STEM Education, and Expected Labor Market Participation in Gulf Cooperation Council Countries', *Digest of Middle East Studies* 25/2 (2016), pp. 362–92.

'The lack of highly skilled human capital in R&D and innovation management is the main issue and not finance.'

During the in-depth interviews with six firms, all managers expressed their dissatisfaction with the quality of Kuwaiti tertiary education, especially when compared to foreign universities. One HR manager stated:

'Graduates from local universities have no practical experience, they are disconnected from the industry. I visited one university in Sweden, and I saw how the students are tinkering with expensive industrial equipment.'

According to our survey, more than half of the firms have less than 10 percent of staff who graduated from foreign universities. Another crucial factor which was often raised in the discussion with the firms during the survey is the lack of significant research outputs from local universities. One plant manager claimed:

'Even when research is conducted, it is not necessarily aligned with industry needs.'

It is also far from clear that local firms would have the capacity to use any research, given their often limited technical abilities. Building the right capabilities and fostering linkages and communication between research, education and industry, thus strengthening the NSI, seem thus to be far more important objectives than financial aspects. Short-term actions to do this might include collaboration in curriculum building, inter-organisation labour mobility and skills migration schemes. A longer-term programme of investments in education and training will also be vital for sustainable economic development and growth.

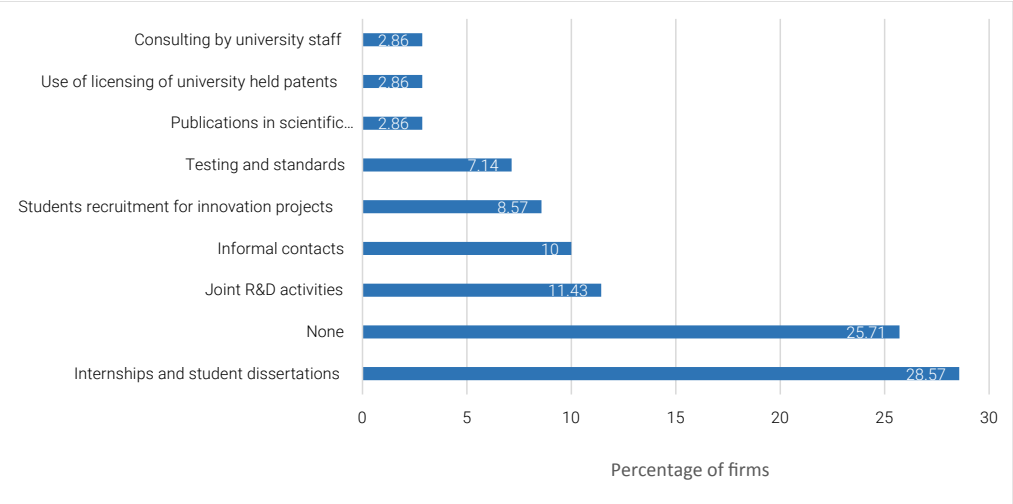
Another major issue, not addressed directly in the survey but which emerged in the reflections of both interviewees and focus groups, is the national business culture. Kuwaiti people, even before oil, are traders by nature and the national mentality of 'quick wins' still dominates business affairs, having been intensified by the discovery of oil.[61] The weak R&D and innovation investment by firms (even the large ones, as the survey shows) reflects this culture, where Kuwaiti businesses are not keen to commit to long-term and uncertain investments.

[61] Rania Al-Nakib, 'Education and Democratic Development in Kuwait: Citizens in Waiting'.

Collaboration with Academic and Research Organisations

Collaboration, and industry-university collaboration in particular, play an important role in addressing the aforementioned NSI challenges.[62] However, current practices in Kuwait do not reflect progress in this respect. Collaborations with academic and research organisations reported by the large firms are very weak (43 percent do not have any type of collaboration), and internships and student dissertations are the most common collaborative channels (Figure 9). This may in part reflect a low absorptive capacity amongst firms. Other recent innovation surveys highlight this general issue,[63] and, according to our survey, external collaboration for innovation in large firms is neither internalised nor institutionalised. These findings are critical since large firms are usually the model for aspiring SMEs. Starting a dialogue between industry and research/academia, while at the same time strengthening the latter towards international standards, to gain trust and build a common platform and knowledge networks is an urgent priority.

Figure 9 – Collaboration with Academic and Research Organisations



The Role of the State

The in-depth interviews with selected firms confirmed the enduring frustration with state bureaucracy and red tape of government procedures. For instance, the issue of allocating land kept surfacing in most discussions. The lack of STI infrastructure and customised programmes to sponsor R&D and innovation activities were also stressed as critical areas that the government needs to address. On the other hand, more than two thirds of the surveyed firms were not aware of existing government schemes for stimulating R&D and

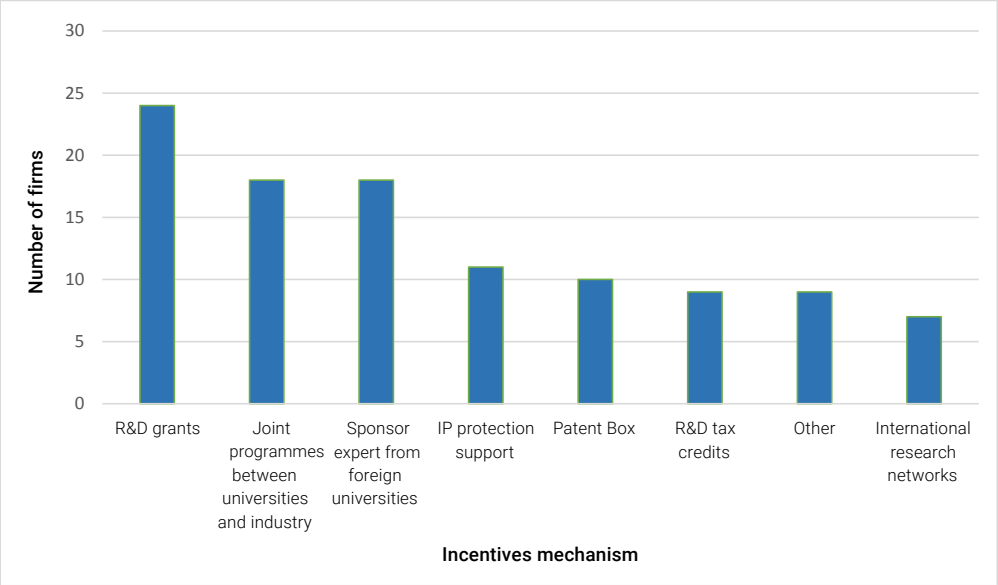
[62] D'Este, Guy and Iammarino, 'Shaping the Formation of University–Industry Research Collaborations: What Type of Proximity Does Really Matter?'

[63] 'Kuwait Enterprise Innovation Assessment Survey (2013-2015)', *KISR*; 'OECD Reviews of Innovation Policy: Kuwait – Overall Assessment and Recommendations', *OECD*.

innovation, and most firms could not figure out how to take advantage of them due to the lack of expertise in the management of innovation.

Finance remains a major concern, and this was reflected in the response to the potential government options to promote private R&D: the most preferred option among the interviewed firms was R&D grants (Figure 10), followed by spurring university-industry collaboration and attracting foreign talent in research. The finding that firms want R&D grants appears to contradict our finding that other factors will matter more. Yet this isn't as surprising as it seems: in the context of a weak innovation system it is not rational for firms to risk their own money, but they would be happy to risk finance from the state.

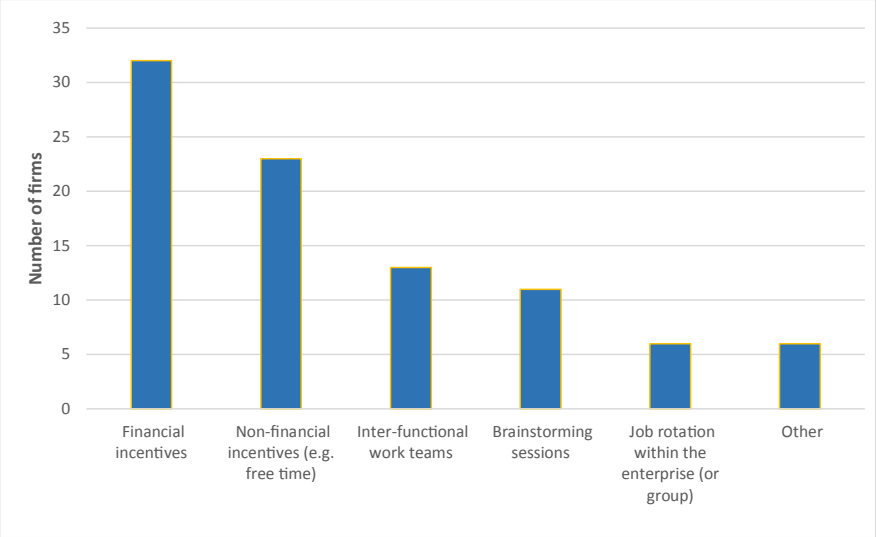
Figure 10 – Potential Government Initiatives to Help Private Business Firms Invest in R&D



Creativity in Business

There is strong awareness of the importance of R&D and innovation in general among the surveyed firms (about 79 percent of firms), and this can be attributed to the active role of organisations like KFAS investing heavily in awareness programmes. For instance, a very successful initiative is the series of talks on the importance of innovation for business competitiveness given by distinguished speakers from abroad. However, when asked about practical innovative solutions resulting from R&D efforts, only 17 percent of the surveyed firms were able to report concrete examples. This again highlights the lack of expertise and processes to manage innovation within (and outside) the firm. Although a significant number of firms are using financial and non-financial incentives to encourage their employees to generate new ideas, important creativity-stimulating methods, such as brainstorming and cross-functional teams, are not in widespread use (see Figure 11).

Figure 11 – Creativity and Innovation Initiatives in the Workplace



Conclusions and Recommendations: How can Private Sector R&D be Increased?

The National Development Strategy of Kuwait 2035 focuses on seven pillars.[64] 'Creative Human Capital' is one of these, and the plan also consists of efforts to increase innovation as part of a wider effort to diversify the economy. This includes around KD 49 million (145 million Euros) allocated to R&D facilities with the aim of helping 'transform Kuwait to an advanced centre of innovation and scientific knowledge'.[65]

Such measures to increase R&D investments are important. However, unless Kuwait addresses systemic weaknesses in its innovation system, they are highly unlikely to succeed. Our research shows that firms in Kuwait are not making significant investments in R&D and innovation. While this is ostensibly on the grounds of cost, underlying this factor is a much greater concern that the systemic features of the NSI are often not there or are incomplete, even in comparison with Kuwait's GCC neighbours. In a high-cost and high-revenue economy like Kuwait, with a very peculiar social contract between citizens and government, investments in R&D are simply too risky given the little incentives and uncertain returns. The low level of R&D in the Kuwaiti private sector is an economically rational response to these problems.

Thus simply focusing on increasing R&D investment is highly unlikely to be a successful strategy. Indeed, there are plenty of examples of supply side innovation policies which have lacked any consideration of the local context and its fundamental conditions, and

[64] 'Kuwait Vision 2035', *Supreme Council for Planning and Development* (Kuwait City, 2009).
[65] Ibid.

thus failed.[66] Kuwait is in a 'development trap': firms will not increase R&D investment because it is not economically rational for them to do so; in turn, it will not become economically rational until a wider set of actors, relationships and institutions have evolved into a coordinated system. Yet institutional change and alignment of objectives is a very slow process,[67] and some of the framework conditions, such as changing societal attitudes towards risk-aversion, can take generations.

If Kuwait is to break out of its development trap, our argument is that efforts to increase R&D investment alone would be futile. We advocate a focus on strengthening the effective NSI actors, their function(s) and developing their relationships by adopting a place-sensitive approach to maximise the existing local potential as the correct/optimal strategy to balance the short to medium and longer-term goals. In particular, throughout our research, a core theme was the inadequate supply of skills and capabilities deriving from Kuwait's education and training system.

What policy should Kuwait follow? One problem faced by Kuwait is the lack of role models. Few countries have been in a similar 'development trap', and models such as Norway, which have had some success in diversification, do not have a directly comparable institutional configuration and adopted an entirely different trajectory at an early stage of development. Instead, any policy needs to be tailored to Kuwait's specific circumstances, challenges and opportunities, taking into account some positive trends and examples in other GCC economies, and possibly some practices of developmental states in the emerging world, particularly Asia.

Our research suggests the following priority areas for policy.

1. Rethinking the education system at all levels, and beyond formal education. As seen in this report, the aspirations for a 'knowledge economy' are frustrated by an underdeveloped schooling and university system, which lags behind other GCC economies, and is unable to provide adequate STEM and STI skills to industry, as well as the managerial and organisational capabilities for the required institutional change both in the private and public sectors. More generally, underpinning any innovation-led diversification process must be the education and competences of the Kuwaitis themselves in a system able to promote critical and innovative thinking, rather than nationalist identity.[68] This is not simply about short-term skill supply, but also about balancing this supply in the longer term with expertise required in any economic transition. Without developing such skills and capabilities, any serious attempt to gradually change the social contract, to spur a more creative and entrepreneurial society, and to restructure innovation governance will be jeopardised.

[66] Rhiannon Pugh, Niall MacKenzie and Dylan Jones-Evans, 'From 'Techniums' to 'Emptiums': The Failure of a Flagship Innovation Policy in Wales', *Regional Studies* 52/7 (2018), pp. 1009–20.

[67] Nick von Tunzelmann, 'Regional Capabilities and Industrial Regeneration', in Martab Farshchi, Odile Janne and Phil McCann (eds), *Technological Change and Mature Industrial Regions: Firms, Knowledge and Policy* (Cheltenham: Edward Elgar, 2009), pp. 11–28.

[68] Martin Hvidt, 'The State and the Knowledge Economy in the Gulf: Structural and Motivational Challenges'.

2. Implementing a bottom-up diversification and internationalisation strategy - starting from some of the existing and more open industries in both manufacturing and service sectors, and in their intersection. A careful analysis of domestic and global value chains (GVC), particularly within the GCC region and in other developing and emerging economies, may uncover potential for upgrading in higher value-added lines of production. Diversification is easier if making short leaps into related sectors rather than developing entirely new ones, but diversification may also mean enhancement of what already exists. Processes of entrepreneurship, labour mobility or knowledge sharing are more likely to successfully seed new activity which is similar to existing activity. On the other hand, these processes are likely to be constrained in a situation where there are entrenched interest groups and few incentives to branch out. Trade, FDI and GVC integration are deemed crucial variables for diversification in a country with a small domestic market such as Kuwait. However, restrictive migration policies combined with a sub-optimal education system (see point 1 above) mean that the skills base on which successful FDI investments often depend are not there, hindering the ability of foreigners to contribute to the Kuwaiti economy.

3. Strengthening the Kuwait Information System. This is a horizontal action, suggested also by the direct experience of our research team of restricted access to, or total lack of, the relevant data. It is imperative to use ICT technologies to build, manage and provide access in an integrated way to the flows of data and information necessary to assess and monitor the NSI (and its components') performance over time over a number of variables, thus providing the basis on which to make adaptive policy decisions. A national statistical information system concerning all institutional sectors (households, firms and government) is vital not only to analyse structural change, but also for both policy design and evaluation, as well as for corporate strategic choices and investment. It should include explicit indicators to monitor progress towards agreed outcomes, and to enhance socio-economic and policy analysis. The long-term experience of the European Union at all levels of geography is particularly important as a point of reference.[69]

4. Governance review. A huge challenge for the Kuwait NSI is the leadership of the innovation process. Despite generous budgets and communication efforts by KFAS, there is no central body responsible for innovation policy and, even more importantly, for its integration with other policy areas. There have been calls for the creation of a designated agency to guide STI strategies, but so far this role has been played by a collection of actors. Despite their commitment, the result has been that some basics of innovation policy, such as objectives and relationships with the broader socio-economic system, are weak or absent. A thorough governance reform is absolutely necessary but recommendations in this regard are well beyond the remits of this project. Suffice to say that a governance review requires, again, high level capabilities, both in the short and long term, which are not presently available.

[69] For more information on European statistical work see https://ec.europa.eu/eurostat/web/european-statistical-system.

Our research thus shows that the clearest and most urgent case for reform is in the education system, both at school level and in higher education, as well as in the complementary vocation and long-life training sector. Skills and capabilities of the people of Kuwait need to be at the heart of any development strategy. However, there is a significant gap in the evidence around how Kuwait can create an education system which meets the expectations of a more innovation intensive and open economy. Despite a number of reports focused on Kuwait's NSI and the potential drivers of diversification, this – the most fundamental factor – seems to have been relatively underplayed.

Our research has pointed to some important avenues for future research. The problems we identify in the Kuwaiti education system are not new, but they are pervasive; there is an urgent need for further comparative work on how best to address them. Our research has also highlighted the importance of a bottom-up strategy for diversification of the economy. Further work should take this bottom-up approach, identifying the existing assets and capabilities of the Kuwaiti economy, and drawing out realistic next steps to diversification from there.

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