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Article

Systems of innovation, diversification, and the R&D trap: A case study of Kuwait

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Abstract

The relationship between research and development (R&D) investment and economic development is well established. Yet, at a global scale, the resource-rich countries of the Gulf Cooperation Council are consistent outliers in this relationship, combining rich-world national incomes with R&D expenditure of developing countries. This paper uses a case study on Kuwait to illustrate a particular form of developmental trap, a version of the resource curse, which makes it irrational for private business firms to invest in R&D and innovation. Based on an analysis of the literature and secondary data, focus groups, and an original survey of large manufacturing firms, we argue that a narrow focus on R&D-led diversification of economic activity ignores the systemic problems faced by Kuwait and, particularly, the unsuitable supply of skills and capabilities provided by the national education and training system.

Key words: R&D; innovation systems; diversification; resource curse; Kuwait.

1. Introduction

The link between research and development (R&D), innovation, and economic development is well established. In general, there is a close relationship between R&D expenditure and GDP per capita, as richer countries invest more in R&D (Fig. 1). Yet, there are a small number of exceptions: in particular, the oil-rich states of the Gulf Cooperation Council (GCC) combine rich-world GDP per capita with the R&D spending of developing economies. These nation states have found an alternative route to prosperity, based on the exploitation of hydrocarbon natural resources, but it is one which is unlikely to last (Porter 2003). Rapid increases in the global supply of oil, due to new technologies and the shale oil industry, have threatened traditional producers (Mirzoev et al. 2020). There are also well-known technological, environmental, and socio-economic reasons—in particular, the shift to renewables and low-carbon electricity—for why oil wealth is unlikely to sustain high living standards in the long term.[1]

Recognising the problems challenging an oil dependent economy, the Gulf states have made multiple attempts to diversify their economies towards knowledge-based, private sector activity (Mahroum and Al-Saleh 2015). The aim of increasing private sector R&D has been justified as a way to address two of the major challenges faced by the GCC countries: a lack of diversification in the economic structure and an expensive public sector (Ennis 2015). Notwithstanding the long history of these attempts, few of the GCC economies have managed to diversify into R&D-intensive activities (Carvalho 2018). Despite the significant sums invested in foreign consultancy and considerable policy support to incentivising business firms to conduct R&D, spending on innovative activities remains low.

This paper examines why this is the case in Kuwait, a country with the sixth highest GDP per capita in the world (2016), but where business R&D is at levels that would be expected in a much poorer country. There have been multiple attempts to diversify the economy into R&D-intensive sectors, but all have broadly failed. Instead, more than 80 per cent of government spending is funded by fossil fuel revenues, the fourth highest in the world (World Bank 2019). Our primary research question is: *what are the barriers to private sector R&D in Kuwait?* We use mixed methods and multiple data and information sources to answer this question: an in-depth review of the literature and of policy documents, interviews and focus groups with key stakeholders, and an original survey of business firms.

Rather than seeing fossil fuel revenues as an asset that can be harnessed to incentivise R&D activity, we argue instead that Kuwait is in a form of developmental trap—the 'R&D trap'—as the economy is locked into a set of circumstances that make it economically irrational for firms to invest in R&D. In addition, in the oil sector, current efforts in energy-technology R&D are still inadequate in relation to the scale of challenges and opportunities (Holdren 2006). The sector is dominated by multinational enterprises, and the bulk of innovations are originated in upstream activities, such as service companies based in developed countries (Perrons 2014), and deployed as off-the-shelf and established technologies to downstream firms elsewhere.

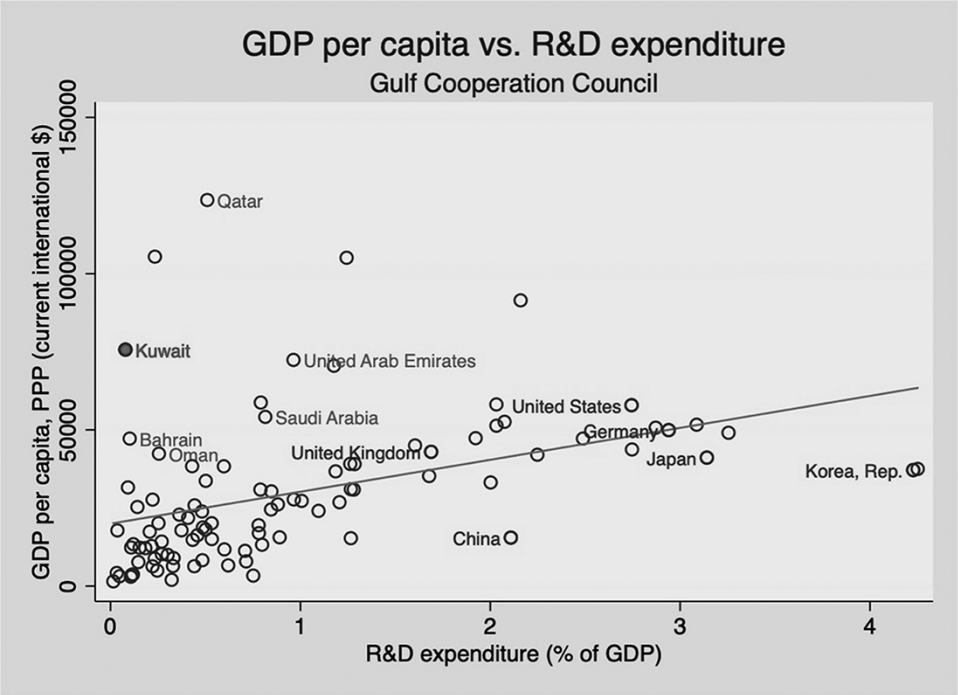

Figure 1. Kuwait and selected countries: GDP per capita vs. R&D expenditure.
Note: Country data for 2016. ***Source***: Authors' own elaboration on World Bank Indicators.

We argue that because the problems faced by Kuwait are systemic, so must the response be. There are strong processes of institutional inertia (Uyarra et al. 2017), which apply both at business and government levels and prevent firms from breaking through into R&D-intensive activity. Therefore, a gradual diversification strategy that starts from sectors and capabilities already established is likely to be more effective than an attempt at a radical shift into entirely unrelated industries and competencies.

To support this argument, we draw on both the literature on national and regional systems of innovation, which has largely ignore GCC countries, and that on diversification and rentier states. In so doing, this paper contributes to the literature by applying the innovation systems' perspective to Kuwait, by extending the debate on diversification and rentier states to include R&D-based policies—traditionally seen as vital for diversification, but under-explored—and by presenting original evidence on the relationship between innovation input and economic development output in the Kuwaiti case.

The remainder of the paper is structured as follows. In Section 2, we briefly recall our conceptual framework based on the systems of innovation approach and how it relates to barriers to business R&D expenditure in a country like Kuwait. Section 3 then describes our mixed method approach, whilst Section 4 offers an overview of the main findings. Section 5 concludes with a discussion of the implications for policy in Kuwait and in similar contexts.

2. Research background

2.1 The systems of innovation approach

Our theoretical basis is the systems of innovation literature. This argues that innovation is not simply a function of the actions of individual actors, such as firms, entrepreneurs, or universities, but also their dynamic interactions and networks (e.g. Freeman 1987; Lundvall 1992; Nelson 1993). Compared with a narrow focus on the individual economic agent, the system of innovation approach involves the consideration of history and evolutionary processes, allows comparisons between very different social and techno-economic organisational structures, and highlights the importance of institutions in innovation processes (Edquist 2004: 485). It focusses on systemic interactions in the generation and diffusion of innovation, which have long been recognised as key determinants of technological and economic performance of countries and regions, which cannot be explained only in terms of strategies and performance of firms (Iammarino 2005). These interactions help exchange knowledge between different actors, encouraging the creation and diffusion of new ideas, solving coordination problems, and reducing the barriers to innovation (Autio and Thomas 2014).

The conceptualisation of the National Systems of Innovation (NSI) has undergone numerous stages over time: from its original conception as a system of components and relationships to a functional approach that also considers subfunctions or activities that contribute to innovation (e.g. Galli and Teubal 1997). However, when it comes to differences in structural and institutional features of socio-economic systems—as, for example, in the case of emerging or developing countries or peripheral regions—the NSI conceptions need to be adapted in 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' innovation system is supposed to have (e.g. Iammarino 2005; Lundvall et al. 2009; Tödtling and Trippl 2018). Since scholarly definitions of NSIs have too often

been interpreted rigidly and linked to innovation measured in terms of macroeconomic performance, the only way forward according to widespread policy practices has been to maximise the amount of inputs to innovation, instead of understanding how (and which kind of) innovation takes place and is transformed into economic outcomes (Lundvall et al. 2009) and how to build local technological and institutional capabilities (e.g. Adeoti 2002; Watkins et al. 2015). Following the evolutionary perspective, a NSI can 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 (Lundvall et al. 2009: 7).

This latter definition appears particularly relevant to represent socio-economic systems profoundly different from those in the 'iconic Triad' in which the NSI concept was first elaborated. Emerging and developing countries, especially when strongly endowed with abundant natural resources, must first develop suitable capabilities for orienting the pattern of economic coordination and specialisation towards higher rates of learning capacity and competence building (Jensen et al. 2007).

Beyond new knowledge creation through R&D, complete and functioning innovation systems encompass—capability building through education and training, organisational capacity in both public and private sectors, density of market and non-market networks, and policies and mechanisms to ensure institutional adaptation to internal and external change of a variety of categories of actors (e.g. Chaminade and Padilla-Pérez 2017; Choi and Zo 2019; Edquist 2004; Perez 1985; Spithoven and Knockaert 2011). A functioning innovation system is seen as a necessary pre-condition for ensuring that private sector R&D expenditure can first occur and then translate into successful market outcomes.

2.2 NSI in rentier states

Research on systems of innovation indicates the importance to refer to the wider set of national institutional and economic structures, which shape the ways in which individual actors act and interact (Allard et al. 2012; Lundvall et al. 2009; North 1990). This point is particularly relevant when considering the GCC states, where structural conditions hinder the ability of firms, states, and other actors to effectively build and complete NSIs (Osman 2015). Building and maintaining a knowledge base is a complex and difficult undertaking and itself only one step towards achieving a genuine NSI (Brinkley et al. 2012; Gackstatter et al. 2014; Liu and Chen 2003).

While there are multiple research institutions in GCC economies, there are few incentives for the private sector to engage in R&D and commercialise research (Hertog 2013). Initiatives to spur R&D by establishing dedicated research centres, such as the Kuwaiti Institute for Scientific Research (KISR), have had success in specific research areas. These centres are mainly populated by foreign researchers 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 the collaboration between research institutes, industry, and the government to facilitate knowledge sharing and commercialisation is weak, as are their overall relations and communication channels (Brinkley et al. 2012). The limited commercialisation is also partly due to the status of intellectual property laws in the GCC region, which have been defined as lax and as lacking enforcement (Osman 2015).

Kuwait nationals are guaranteed public sector employment with higher salaries and better working conditions than in the private sector. As a result, they have little incentive to support policies promoting private sector development. In contrast, there is a more positive attitude towards entrepreneurship, business growth, and innovation development in relatively poorer or larger GCC countries (Bahrain, Saudi Arabia, and Oman), where a higher share of the population is likely to be employed in the private sector (Herb 2009). This sharp dichotomy between private and public spheres of the economic system distorts motivations for seeking higher education or engaging in life-learning capability upgrading (Osman 2015). GCC countries cannot perpetuate the current mechanism where the natural wealth is distributed by providing lucrative jobs in the public sector. Hence, the social contract needs to be revised to address future employment challenges (Forstenlechner and Rutledge 2010).

More generally, it has been put forward that the failure of Arab Gulf societies to develop technological and institutional capabilities to foster innovation is primarily due to their 'rent-dominated' political cultures: the more democratic governments become in these countries, the more likely they are to lead their people to the promised land of technological self-sufficiency (Zahlan 2006). However, in the case of Kuwait, the democratic government alone was not enough to spur economic growth that is not based on its natural endowment. Advancing simultaneously on social and economic structural changes can achieve faster and sustainable economic development (McMillan et al. 2017), and Kuwait is currently lacking in both.

Kuwait holds generally free and fair parliamentary elections with near universal adult suffrage for citizens. Its parliament is the strongest in the Gulf and among the strongest in the Arab world. At the heart of the parliament's power lies the ability of a majority of elected members to be able to express a vote of no confidence in individual ministers. However, this structure tends to have the counter effect to lead to political deadlock and to paralysis of large-scale projects that would benefit the whole economy (Al-Mutairi et al. 2020; Herb 2009; Osman 2015). This hinders the government's ability to deliver on the established development strategies and leads to a general uncertainty about state commitment to innovation policy, further reducing the confidence of the business firms and their willingness to make investments in R&D.

The innovation systems' view emphasises that internal and external networks and flows of resources (e.g. Iammarino 2005; Lundvall et al. 2009), 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 GCC states—in FDI. Foreign firms in Kuwait complain consistently that it is a more difficult and less profitable place to do business than its neighbours in the Gulf, in particular Dubai (Herb 2009).

Furthermore, 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 and diverse environments (Brinkley et al. 2012). The rigid labour and migration policies create obstacles to recruiting and retaining talent, transferring knowledge and facilitating the contribution of high-skilled foreigners to knowledge creation and innovation (Osman 2015). The current system in all GCC countries promotes importing low-skills labour to meet national urgent and short-term needs (Muysken and Nour 2006). This business practice hinders long-term investment in horizontal and general purpose technologies and R&D-related projects, which could automate routinary work done usually by low-skilled labour, contributing to upgrading local skills and capabilities.

3. Research design

To investigate the barriers faced by Kuwait in its attempts to diversify into R&D-intensive activities, we use a mixed-methods case study approach. Official data on Kuwait is limited and unreliable, so the case study approach allows us to triangulate information from multiple sources. While it is not possible to generalise from a case study (Yin 2011), some comparative reflections can be drawn for some GCC economies. Moreover, a case study allows us to take a more nuanced approach to understanding the activities and motivations of actors in the Kuwaiti innovation system.

We draw on three principal sources: (1) a review of secondary data and previous literature on the country, (2) a series of focus groups/workshops with key business and policy representatives carried out in January 2019 and January 2020, and (3) an originally designed survey of large firms in R&D-intensive manufacturing industries. In the following, we set out each of these in more detail.

3.1 Review of secondary data and documents

We first sought to build up as broad a picture as possible of Kuwait's circumstances. Statistical information came from international sources, such as the World Bank, alongside domestic information on, for example, the sectoral structure of the economy. We also reviewed key policy documents and mapped out the relevant institutions in the Kuwait NSI. This was used to provide the 'big picture' of the economic system of Kuwait and to guide and motivate activities (2) and (3).[2]

3.2 Focus groups and workshops

We complemented our review of policy documents and secondary data with two focus groups with business firms and government or quasi-government agencies in January 2019. The objective of these focus groups was to solicit insights from the key innovation actors in Kuwait (including selected large firms) to understand the current situation regarding private R&D investments and their promotion. These direct engagements with key Science, Technology, and Innovation (STI) stakeholders were critically important to understand the general STI direction in Kuwait and helped in designing the data collection reported in Section 3.3 below. We also tested our emerging findings at a workshop attended by Kuwaiti policymakers in January 2020. These activities allowed us to develop a more detailed and nuanced overview of the strategies and choices of actors; in doing so, we considered their opinions and the rationales for their innovation behaviours.

3.3 Survey of R&D intensive manufacturers

Official data on R&D in Kuwait is poor; thus, to develop an understanding of the extent to which firms are engaging in R&D, we carried out an original survey (during spring and summer 2019) of forty two large firms operating in manufacturing industries likely to have different degrees of R&D intensity. The initially targeted population was large manufacturing firms (i.e. those with more than 249 employees) since R&D investment was the main variable to capture: it consisted of all ninty large manufacturing firms included in the database provided by the Public Authority for Industry in 2018. The response rate on this first firm list was about 24.4 per cent, with twenty two firms participating in the survey after several reminders. Another 130 firms were identified based on a private database owned by a Kuwaiti firm specialised in surveys in the GCC countries: 50 firms responded, and 20 firms of those fulfilled our criteria. Therefore, our final sample was 42 firms.

Although the objective was to conduct face-to-face interviews, other methods were offered as additional data-gathering mechanisms once the firm refused to meet in person. These included telephone interview and an online questionnaire. More than 40 per cent of the firms accepted face-to-face contact, and each interview lasted for an average of one hour; the rest opted for phone interview. The majority of the interviewees were senior managers. Participant firms were asked if they were willing to be involved in more in-depth conversations to elaborate beyond the semi-structured interview base, and six firms accepted. These in-depth interviews generated additional qualitative data and provided further insights.

4. Kuwait's innovation system

4.1 R&D activity in Kuwait

Kuwait's R&D expenditure is low even by the standards of the Gulf. Estimates of R&D spending by international organisations differ but consistently show this problem. The World Bank estimates that, in 2014, only 0.4 per cent of Kuwait's GDP was spent on R&D compared to a Middle East and North African average of 0.93 per cent and an OECD average of 2.4 per cent.

Official survey evidence is consistent in showing low R&D investment. The 2017 Kuwait innovation survey—which sampled firms of all sizes and sectors—shows that across the Kuwaiti economy, only 9.3 per cent of firms invested in R&D (KISR 2017). The figure is, for obvious reasons, much higher amongst large firms in R&D-intensive sectors. In our own survey, 78 per cent had conducted internal R&D activities in the previous three years. Yet, while firms did conduct R&D, expenditures were often small: only four out of the forty two interviewed firms declared an annual R&D budget of KD 100,000 (around 300,000 Euro) and above; fewer than 5 per cent of firms had more than twenty R&D staff, and fewer than 20 per cent reported technological innovation as a result of in-house R&D operations. Despite being in R&D-intensive sectors, most of these firms had few internal R&D capabilities: more than one-third of the interviewed firms did not have a dedicated department or organisational unit to handle R&D and innovation activities.

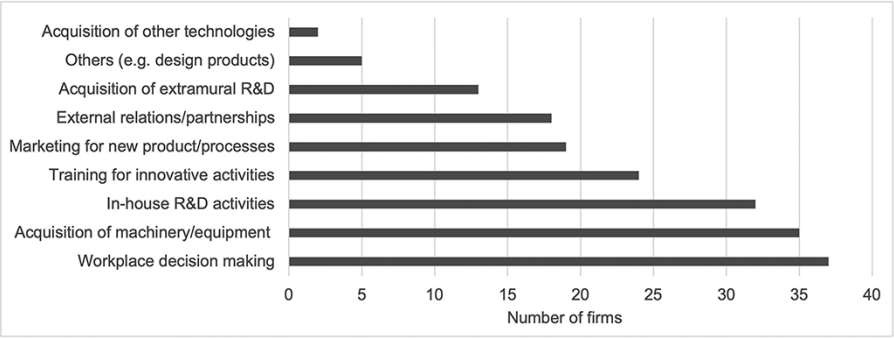

Figure 2. Types of innovation activities.
Note: Sample size $N = 42$ firms.

In-house R&D is only one form of innovation-oriented activity, and in a resource rich economy such as Kuwait, it might be that firms are simply buying in new technologies from elsewhere. Yet this does not seem to be the case. Figure 2 below shows the share of firms declaring to have conducted other forms of innovation activities. Most businesses were risk averse and did not invest in new or emerging technologies: apart from in-house R&D, the top innovation activities include the acquisition of machinery and equipment and investing in strategies and training activities; only two firms reported having purchased intellectual property rights (IPRs).

4.2 Institutions and policy context

How have policymakers responded to this poor R&D investment? Kuwaiti policymakers have paid lip service to the idea of diversification and launched a number of grand national plans. Following a fad of similar 'visions' from other gulf states (Olver-Ellis 2020), the latest plan is the Kuwait Vision 2035, launched by the Supreme Council of Development and Planning in 2017. The plan aims to encourage 'the private sector to lead diversification efforts towards a knowledge economy, where economic growth is driven by technological innovation, research, development and the creation of globally competitive high value-added sectors' (Olver-Ellis 2020: 6).

Kuwait Vision 2035 has been developed utilising the strong historic traditions of a pioneering nation in trade and entrepreneurial activities. On the basis of the discovery of oil and the accumulation of an enormous amount of wealth, the relatively open culture, and the capacity to invest in infrastructure, Kuwait aspires to exploit its strategic geographic location, as a gateway to the north of the GCC region, to transform itself into a financial centre and a regional trade hub. The essence of this transformation is driven by an essentially high-tech-oriented strategy, building on Kuwait's existing strengths, especially in terms of its ability of raising and generating capital both onshore and elsewhere through well-established institutions such as the Kuwait Investment Agency (KIA).

Although the pillars of the Kuwait Vision 2035 address innovation in terms of encouraging both human capital and a diversified sustainable economy, there is a need for a clear capability-building centred strategy that could take full advantage of the national aforementioned strengths—both hard (wealth, infrastructure, and location) and soft (open society, trading roots, and creative culture) components—by building, strengthening, and diversifying the skills and capabilities necessary for structural change to occur (e.g. Al-Nakib 2015).

The Kuwait NSI displays a configuration in which the government's role is central (Fig. 3). The government has direct control of STI through the influential Ministry of Finance that approves all the budgets allocated to research and leaves very little autonomy to STI institutes. The Ministry of Higher Education is the governing body of the main players on the supply side, and this includes the already mentioned KISR, the Kuwait University (KU), and the Public Authority for Applied Education and Training. Private universities are as well 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.

A host of government bodies have been created and conferred functions to pursue STI policies. For example, the Kuwait Direct Investment Promotion Authority aims to leverage the potential of innovation-based inward FDI into Kuwait for the purpose of enhancing technology transfer. Moreover, the Public Authority for Industry has embarked on large initiatives to establish science and technology parks involving the private sector, whilst the Kuwait Authority for Partnership Projects has the mandate to facilitate public–private relationships. In addition, The National Technology Enterprises Company, a fully-owned subsidiary of KIA, has the purpose of transferring locally technology and know-how by investing in foreign high-tech firms.

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 industrial diversification agenda. GSSCPD is the central government body that is responsible for leading the country's planning process as mandated by an Amiri Decree No. 33 in 2004, and it reports to the Supreme Council for Planning and Development (SCPD). New research centres have been established in the last few years as part of GSSCPD's effort to improve the quality of the national development plans, such as the Kuwait Public Policy Centre, the National Development Research Centre, and the National Observatory for Sustainable Economy Centre.

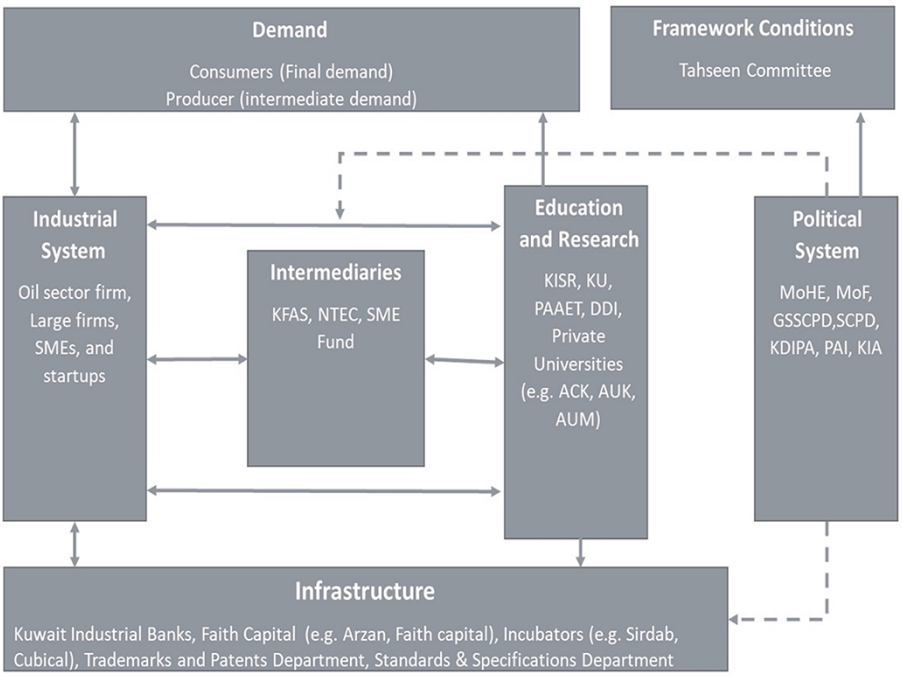

Figure 3. Kuwait's NSI.

Note: Adapted from. Kuhlmann and Arnold (2001).

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.

To address the challenge of the lack of coordination between all these different innovation actors and to improve the framework conditions, the government established in 2017 the Permanent Committee for Streamlining Business Environment & Enhancing Competitiveness. This national committee has been dubbed 'Tahseen', which means 'improvement' (in Arabic), and among its members it includes the GSSCPD, the Kuwait Municipality, the Central Bank of Kuwait, the General Directorate for Customs, the Capital Market Authority, the Kuwait National Competitiveness Committee, and various Ministries. The mission of this committee is to design initiatives to address the weaknesses highlighted in the Ease of Doing Business (EDB) index of the World Bank. The outcome was noticeable and showed encouraging progress (Kuwait joined the Top-20 Improvers in the World in EDB index 2020 out of 190 economies), giving support to continue implementing reform in the direction of a coherent coordination and clear governance of the Kuwait NSI components.

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 still too fragmented governance structure that hinders clear task assignment and responsibility. Providing generous budgets to public research and academic organisations in addition to engaging large firms to fund KFAS is not enough to stimulate R&D and innovation in the private sector.

The non-business providers of innovation, represented by few research institutes and universities led mainly by KISR and KU, create most of the knowledge base for the Kuwaiti NSI. Both 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 resources, water, energy, and the environment, which are aligned with the enduring national challenges. KISR's research budget in 2017–8 was 53.3 million KD (around 145 million Euro), while KU's research budget was only 4 million KD (around 11 million Euro) in the same fiscal year (OECD 2019). KISR has been leading the R&D strategy in Kuwait, and it has devoted a lot of its effort to registering patents; however, very limited attention has been paid to the developmental side to exploit the generated IPRs. KU has also invested in IPR-generating activities, but commercialisation has yet to materialise, demonstrating the persistent technology-push orientation as opposed to a market-pull technological demand. This confirms the 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 and the American University of Kuwait.

The in-depth interviews with selected firms confirmed the enduring frustration due to state bureaucracy and red tape of government procedures for business. 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. On the other hand, more than two-thirds

of the surveyed firms were not aware of existing government schemes for stimulating R&D and innovation, and most interviewees could not figure out how to take advantage of them due to the lack of expertise in innovation management. Finance remains a major concern, and this was reflected in the response to the potential government options to promote private R&D: the preferred option among the interviewed firms was R&D grants, followed by spurring university–industry collaboration and attracting foreign talent in research.

Although there are various institutions playing important roles as innovation actors in the Kuwaiti NSI, there is no general direction and fragmentation of responsibilities to ignite the necessary changes that would enable the country to embark on an STI-led journey. This is partly due to the lack of a national innovation policy and any centralised framework to guide such endeavour. There has been an effort to establish an STI council to address this issue, but it has been delayed and eventually abridged to a national committee, which is still being discussed.

4.3 Human capital and the education system

R&D lies at the heart of the innovation system approach, as does capability-building, that is, the provision of education and training, creation of a diversified human capital, production, and reproduction of skills, life-long learning, and training in the labour force to be used in innovation and R&D activities. Yet, a major problem Arab Gulf countries face is that existing workforce's skill levels are low by world standards (Davis and Hayashi 2007). A deficient and obsolete education system and the large share of unskilled and semi-skilled foreign workers (and the complementary lack of foreign high-skilled workers) are serious deterrents to the implementation of strategies to reduce the dependence on foreign technologies and oil exports (Muysken and Nour 2006). 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 education system of a country such as Kuwait (Al-Nakib 2015). First of all, 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 (Al-Nakib 2015). The current educational systems by and large do not prepare the students adequately for either pursuing further studies or engaging actively in a new sustainable economy for the future (Hvidt 2015).

The aspiration to a 'knowledge economy' boosted school enrolment rates and adult literacy in the past few decades but failed to foster civic values, skills, and creativity. It has become increasingly apparent that the quality of education, curriculum development, teacher training, expansion of vocational and technical education, and ultimately the creation of a pluralistic educational framework, all would contribute to the strengthening of the Kuwait NSI structural change (e.g. Alhashem and Alkandari 2015; Al-Nakib 2015; Safwat 1993).

Furthermore, public sector wages set a 'reservation wage', and citizens in Kuwait, the UAE, and Qatar rarely work for less. It is not surprising that the business sector—as also emerged clearly from both our focus groups and firms' opinions (see section below)—has little incentive in employing citizens; this is especially true for those with fewer skills. Expatriate wages in the private sector, with the exception of the most skilled labour, are well below the level paid to citizens in the public sector (Fasano and Goyal 2004). These labour market features provide no incentives for organisations to invest in transferring knowledge to nationals (Bunglawala 2011), and hamper risk-taking private ventures such as entrepreneurship that generate value added (Hertog 2010). Indeed, as discussed below, the most important problem perceived by business firms is the general lack of skills and capabilities for innovation.

Including 'Creative Human Capital' as one of the key pillars of Kuwait Vision 2035 (SCPD 2009) expressed the awareness of the government of the importance of diverse and updated capabilities in Kuwait's future. However, this long-term investment should be reflected in an education system deeply reformed and designed to boost innovation in the long term through the diffusion of new skills (e.g. ICTs, STEMs) and inventiveness from early stages of schooling and capacity-building delivered via up-to-date university curricula and specialised training programs (e.g. Al-Atiqi and Alharbi 2009; Al-Nakib 2015; Wiseman and Anderson 2012).

4.4 Firm-level barriers to R&D investment

Our survey's primary aim was to identify firms' perceptions about the main barriers to R&D and innovation (Fig. 4). The insights from the focus group sessions and the in-depth interviews complemented the survey results, although the themes that surfaced in the focus groups' discussion were not based on guided questions. The themes discussed in this section, along with the survey results, include the following:

- Cost is not the key obstacle to innovation but the lack of skills;
- Urgent need for effective research-industry collaboration;
- Lack of R&D infrastructure;
- Mismatch between the educational outcomes and the industry skill needs;
- The work culture hinders innovation and entrepreneurship.

The survey showed that the most important barrier indicated by the interviewed firms was costs. A version of the Dutch disease exists in countries like Kuwait, as apparent affluence is associated with increased costs—making diversification harder. Our findings are in line with the Kuwait Innovation Survey, where 43 per cent of firms declared to be hampered by high costs, 42 per cent indicated lack of funds within the enterprises or group, and 35 per cent lack of funds from outside (KISR 2017).

However, in line with recent empirical studies on European countries (e.g. D'Este et al. 2012; Iammarino et al. 2020), the issue goes well beyond financial constraints. KFAS offered several programmes to sponsor private sector R&D activities during the last five years, and most firms were not able to take advantage of such programmes: only one firm declared to have benefited from the KFAS innovation schemes. In one of the stakeholder engagement sessions (focus groups), a KFAS representative openly supported this view:

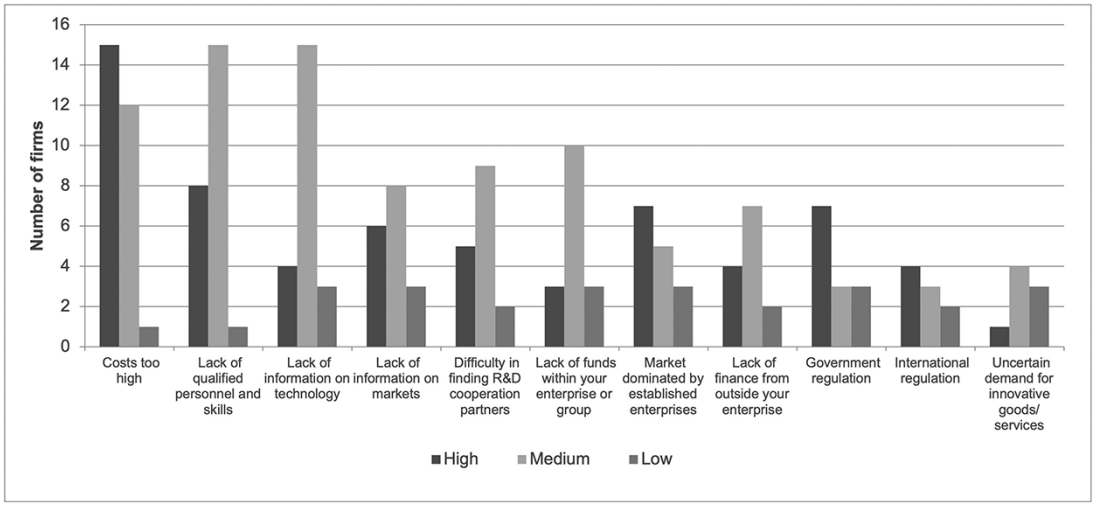

Figure 4. Obstacles hampering innovation activities.

Note: High, medium, and low refer to the degree of importance indicated by the interviewee.

> 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 low percentage of employees with STI-relevant skills declared by the surveyed firms (e.g. only one firm had half of their staff with STEM degrees). In the focus group conducted with key innovation actors, R&D funding agencies and research organisations expressed the lack of beneficiaries of their diverse programmes. One of such actors from the supply side claimed that:

> 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 the 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 per cent staff graduated from foreign universities. Another crucial factor commonly raised is the lack of significant research outputs from the local universities. One plant manager claimed:

> Even when research is conducted, it is not necessarily aligned with the industry needs

Building the right capabilities and fostering linkages and communication between research, education, and industry—thus strengthening the NSI pillars—seem thus to be far more important objectives than financial aspects. In 2018, Kuwait was ranked 120 out 140 countries in the Labour Market index of the GCI. Actions regarding labour mobility and skills migration schemes are absolutely necessary to attract and retain appropriate competences and capabilities in the short term while investing in education and training in the longer term as part of coherent reforms for sustainable economic development and growth.

Another major issue, not addressed directly through the survey but 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 even intensified by the oil discovery (Al-Nakib 2015). The weak R&D and innovation investment by firms (even the large-sized ones, as the survey shows) reflects this culture, where Kuwaiti businesses are not keen to commit to long-term and uncertain investments.

4.5 Systemic barriers

Collaboration and industry–university linkages in various areas of knowledge creation and diffusion in particular play an important role in addressing the aforementioned NSI challenges (e.g. D'Este et al. 2012; Schiller and Liefner 2007). However, current practices in Kuwait do not reflect any progress in this respect. Collaborations with academic and research organisations reported by the large firms are very weak (43 per cent do not have any type of collaboration), and internships and student dissertations are the most common collaborative channels (Fig. 5).

Again, this is in line with the Kuwait innovation survey, which highlights this general issue (KISR 2017; OECD 2019); from 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 of aspiring small and medium enterprises. Urgent priorities are both improving the dialogue between industry and university on human capital provision, new skill needs and curricula, and strengthening the academic and research system towards international standards.

Lack or weakness of systemic linkages was also reflected in the response to the potential government options to promote

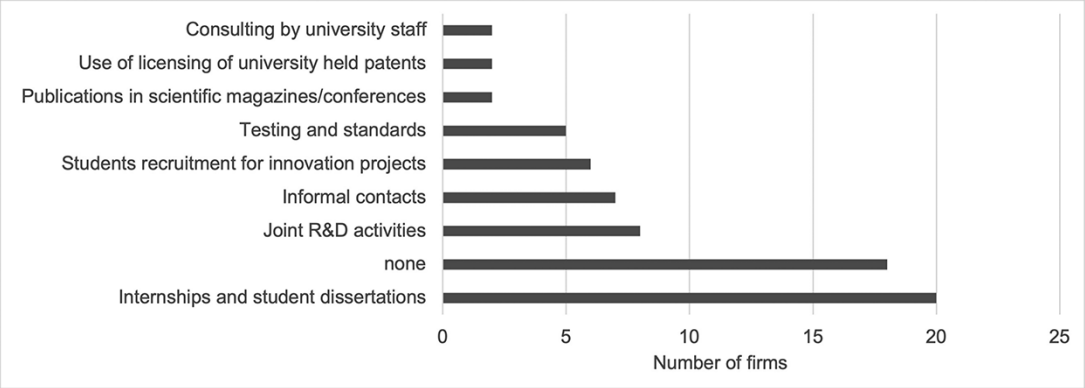

Figure 5. Collaboration with academic and research organisations.

private R&D: among their most preferred options, firms indicated R&D grants, followed by spurring university–industry collaboration, and attracting foreign talent in research.

5. Discussion and conclusions: breaking out of the R&D trap

This paper has combined multiple sources to investigate the question of how a country such as Kuwait may increase private sector R&D. Basic data on R&D spending in Kuwait is often inadequate, and our research can only be seen as a first step to addressing this question, which will only become more urgent over time. The global health crisis due to COVID-19 has brought disruption to the global economy. Importantly, it has highlighted that rentier nation-states, such as Kuwait, cannot continue to depend on a sole income from perishable natural resources that proved to be unstable in the past as well due to the oil price volatility. Hence, there is now an even more urgent call to adopt a capacity-building strategy at the system level to improve its resilience in such a dramatic double whammy supply-demand shock and most importantly to ensure sustainable economic growth.

The need for economic diversification in the Gulf is long-standing and obvious: countries such as Kuwait need to move from a dependence on oil exports to knowledge-based activities that will sustain the economy over the long-term. Yet, the roads taken so far have been, largely, dead ends. A mini-industry of foreign consultants has emerged, writing reports advising on diversification into innovation-intensive activities, science parks, and incubators. However, as stand-alone policies, these initiatives, although well intentioned, have little chance. Public-funded R&D activities are not an end in themselves but need to be considered alongside bottom-up and downstream activities in firms and other organisations and in their interactions. Without considering the wider innovation system, isolated efforts are doomed to fail. This development trap is a self-reinforcing process where a lack of incentives to conduct innovation creates conditions that hinder the development of the wider ecosystem, which, in turn, would provide incentives to create innovation.

In simple terms, Kuwait is in a special kind of '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 (von Tunzelmann 2009), and some of the framework conditions—such as changing societal attitude towards risk-aversion, diversity, and creativity—can take generations. This is a specific form of the resource curse that has been well documented in literature (Frankel 2010), but that in the case of Kuwait occurs in a context in which, for example, the public sector provides easy access to contracts for the private sector, the education system fails to produce updated skills or be attractive to foreigners, and networks for knowledge creation and diffusion are sparse.

Although many previous research studies showed that countries endowed with natural resources could face various challenges, as has been the case of Kuwait, there is still a debate about whether the resource curse is inevitable, with some arguing resources are an opportunity if managed well (World Bank 2008). Norway is an excellent example of developed countries, and Botswana's strategy in dealing with diamond discovery is also a great example among developing countries. Lederman and Maloney's (2006) reviews of the related empirical evidence demonstrated that natural resources could be utilised as an economic development lever when combined with the accumulation of knowledge for economic development and growth.

A systemic problem requires a systemic solution: indeed, the features of the Kuwaiti NSI are often not there or are incomplete, even in comparison with the 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. While there is a literature that considers innovation policy instruments in a decontextualised fashion (e.g. Bloom et al. 2019), doing so risks ignoring both the systemic factors that drive innovation and the importance of a 'policy mix' for innovation processes (Flanagan et al. 2011). There are plenty of examples of supply-side innovation policies, which have lacked any consideration of the local context and its fundamental conditions and thus failed (e.g. Pugh et al. 2018). If Kuwait is to break out of its development trap, efforts to increase R&D investment alone would be futile and often wasteful. Focusing on strengthening the effective NSI actors and their functions and developing their relationships by adopting a place-sensitive approach to maximise the existing local potential seem to be the correct strategy to compromise between short-medium and longer-term goals.

Kuwait's initiative to establish a national STI committee by following best practices in innovation-led strategies (e.g. those in South Korea) can be critically important to enhance the governance of innovation processes in the country. However, to succeed in addressing the issue of a disarticulated NSI, this national committee should be empowered to define the national agenda for innovation and coordinate the efforts to advance innovation in Kuwait as part of its diversification strategy.

Throughout our research and fieldwork, a core theme was the unsuitable supply of human capital by the Kuwait's education and training system, a pillar of the NSI as a whole. To institutionalise and reinforce the Kuwaiti NSI, an in-depth rethinking of the education system at all levels, and beyond formal education, is needed. Kuwait's aspirations for a 'knowledge economy' are frustrated by an underdeveloped and obsolete human capital formation system, which lags behind other GCC economies and is unable to provide the 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. While Kuwait has already attempted many rounds of educational reform, strengthening initiatives on inclusive education and redressing imbalances in religious-based learning vis-à-vis academic improvement have become a necessity (Al-Ajmi 2019; Wiseman and Alromi 2003). More generally, underpinning any innovation-led diversification process must be the competences of the people of Kuwait in a system able to promote critical and innovative thinking rather than nationalist identity (Hvidt 2015). This is not simply about short-term skill supply but 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, open, and entrepreneurial society and to restructure innovation governance will be jeopardised.

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Notes

1. See, for example, Stevens (2019).
2. For further detail on the main features of the Kuwaiti NSI, also relative to the other GCC countries, see Arman et al. (2020), 'Breaking out of the innovation trap? Towards Promoting Private R&D Investment in Kuwait', Final Report from the Project LSE KISR-Kuwait Academic Collaborations, 2018/19.

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