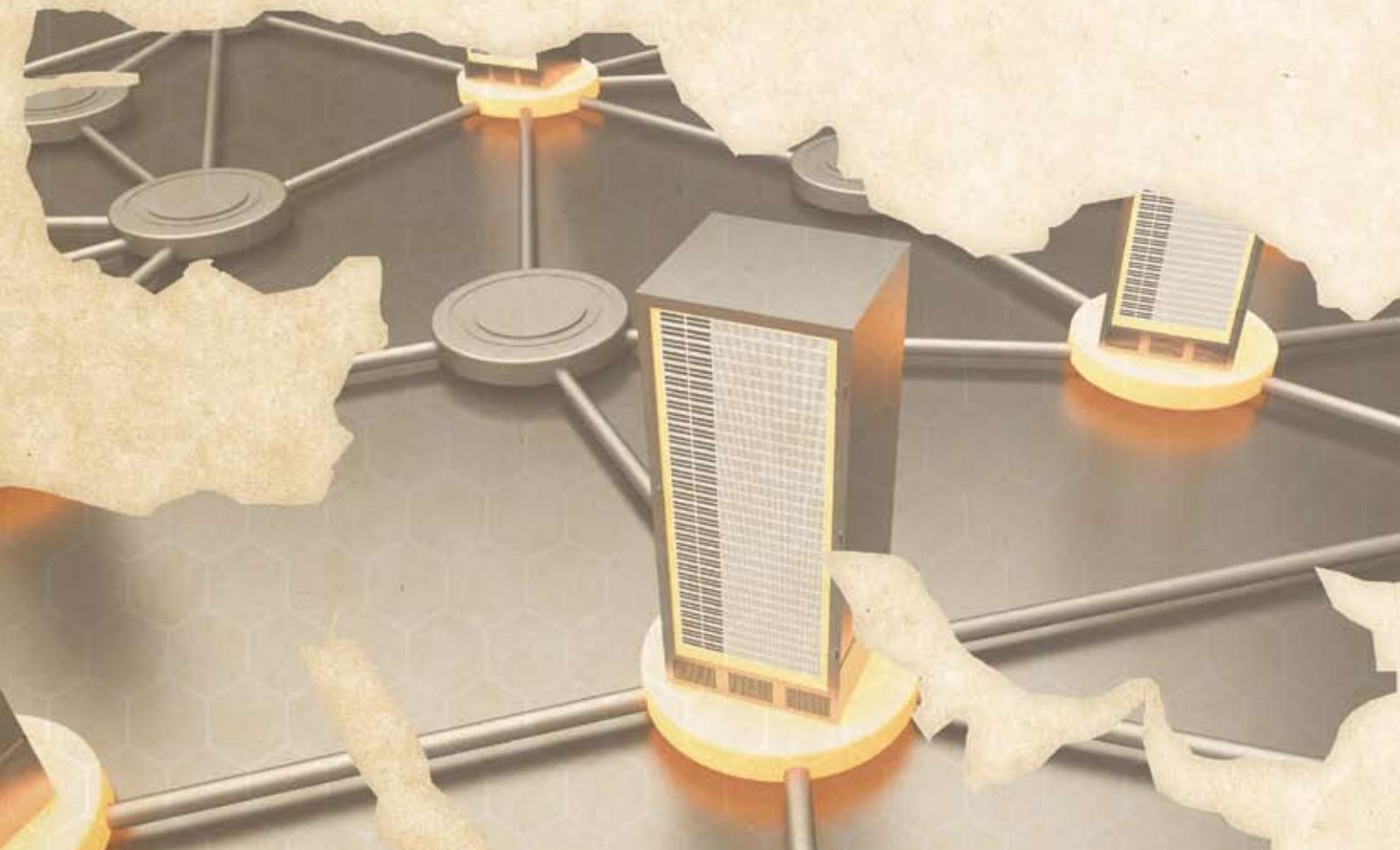


Fostering innovation-led clusters

A review of leading global practices

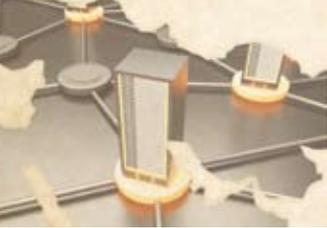
A report from the Economist Intelligence Unit



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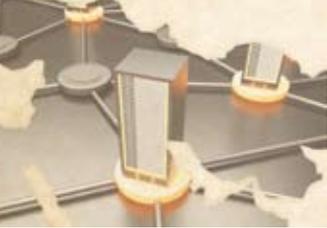
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Preface

Fostering innovation-led clusters: A review of leading global practices is the second in a series of three Economist Intelligence Unit reports on research and development (R&D) in the Middle East. This report casts a spotlight on new ideas and common factors in the success of cluster initiatives globally, with a bias towards those that hold relevance for the Middle East.

The report is sponsored by the Advanced Technology Investment Company (ATIC). The Economist Intelligence Unit bears sole responsibility for the content of this report. The findings and views expressed in this report do not necessarily reflect the views of the sponsor. The report was written by James Watson and edited by Aviva Freudmann.

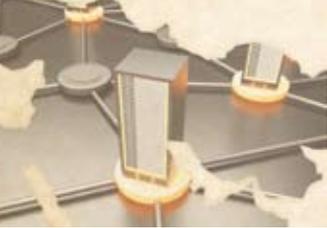
December 2011

About this research

This report draws both on wide-ranging desk research and a global survey of 214 executives with knowledge of their firms' R&D activities.

The report also draws on numerous in-depth interviews. The Economist Intelligence Unit would like to thank the following individuals (listed alphabetically by organisation name), who participated in the interview programme:

- Lim Chuan Poh, chairman, Agency for Science, Technology and Research, Singapore
- Hermann Hauser, co-founder, Amadeus Capital Partners, UK
- Charles Cotton, founder and chairman, Cambridge Phenomenon (promoter of the UK-based cluster)
- Enrico Villa, chairman, CATRENE (Cluster for Application and Technology Research in Europe on Nano-Electronics), France
- Anne Lange, director: public sector, Internet Solutions Business Group, Cisco, US
- Matteo Biancani, project co-ordinator, GEYSERS (EU-funded collaborative R&D project aimed at building a next-generation network)
- Oded Cohn, director of research, IBM Israel
- Joan Bellavista, vice-president, International Association of Science Parks, Spain
- Navi Radjou, fellow, University of Cambridge's Judge Business School, UK
- Pedro Arboleda, partner, Monitor Group (strategy consultants), US
- Martin Smith, head of innovation, PA Consulting (UK-based management and IT consulting firm)
- Steven Geiger, chief operating officer, Skolkovo Foundation (planners of a hi-tech business park to be built near Moscow)
- Jean Boudeguer, executive director, Start-Up Chile (a Chilean government programme to attract entrepreneurs)
- Gran Lindqvist, senior fellow, Stockholm School of Economics
- Eric van der Kleij, chief executive officer, Tech City Investment Organisation (funders of London's technology hub), UK



Executive summary

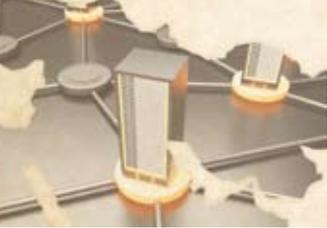
There are few economic development policies as popular as clusters. It is hard today to find a country, region, or even city that is not trying to develop a network of complementary and competitive firms. The political appeal is obvious, particularly now that the world's economic crisis has put a spotlight on innovation to diversify economies and create jobs. However, the difficulty lies in turning a newly announced "science park" or "hi-tech corridor" into a genuinely competitive centre for innovation.

In this report, we review some of the practices and ideas being used by clusters around the world. The aim is to offer a detailed assessment of which of these practices and ideas might be applicable to the Middle East region as it seeks to develop its own innovation-led clusters. The key findings are as follows:

Government has a crucial role to play; so does the market. Although many advocate a wholly "bottom-up" approach to cluster development, it is clear that many clusters have succeeded on the back of government intervention. What is difficult to get right is the scale and type of support: a heavy hand can stifle progress, while too little intervention can lead to a lack of vital support. But while some clusters might work without government backing, none will work without market forces.

Clusters are about collaboration, not just locating firms in the same place. Although innovation networks are increasingly globalised, nearly all experts agree that ideas flow fastest in a local community. As such, a key part of cluster development is fostering such collaboration, especially in countries where this has not been part of the local business culture. As Navi Radjou of the University of Cambridge's Judge Business School puts it: "It's important to take a humanistic, rather than mechanistic, approach to building clusters."

Talent is the single most important factor in developing successful clusters. A government's overarching aim should be to develop a continuous supply of workers with world-class skills. Singapore's cluster success is largely owing to its long-term efforts to develop the quality of its workforce. A related focus should be on encouraging the inward migration of talent from around the world. Attracting a star name in a given field can be a crucial catalyst.



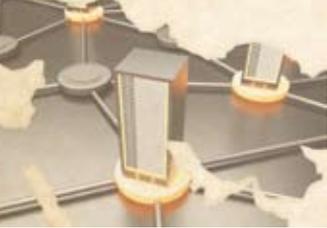
Fostering innovation-led clusters *A review of leading global practices*

Governments need to work to promote a culture of innovation and entrepreneurship. This is especially vital in countries where either the state or state-owned firms are seen as the primary pathways to success. South Korea's cluster success is in part owing to its efforts in promoting entrepreneurship as an alternative to a typical career with its local conglomerates. It is also important to create a culture that tolerates different opinions, creativity and risk-taking. "Culture matters. This is the secret ingredient," argues Oded Cohn, head of research at IBM Israel.

Clusters work best when they are focused and can compete. Many successful clusters are highly specialised: Tainan Science Park in southern Taiwan, for example, developed on the back of liquid crystal technology. Bristol's so-called 'Silicon Gorge' in the UK evolved around microchips. Once a specific focus emerges, governments need to identify it, and then work to remove any barriers to competition.

Governments can do much to create an attractive business environment—and a good place to live. Easing planning rules, tweaking the tax code, removing penalties for failure, smoothing visa and immigration processes, ensuring intellectual property (IP) protection—there is much a government can and must do to support cluster development. Some take extreme measures: Russia's new Skolkovo cluster is developing its own legal framework, distinct from the state, to encourage its development. What shouldn't be forgotten is the importance of also ensuring a good quality of life for prospective employees, to support efforts to attract and retain talent.

A strong local market will help attract R&D investment, but is not crucial for global success. Some clusters, such as Israel's, have succeeded in spite of the absence of a significant local market, as firms are forced to think globally from the outset. But from an R&D perspective, the relative sophistication of local demand is more important than the quantity.



Introduction: Developing clusters

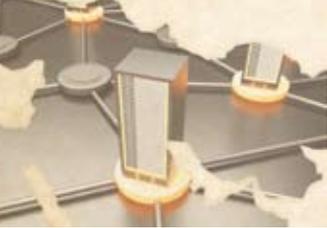
¹Örjan Sölvell et al., *Cluster initiatives in developing and transition economies*, 2006, Centre for Strategy and Competitiveness, Stockholm School of Economics

²Michael Porter, *Clusters, innovation, and competitiveness: New findings and implications for policy*, January 2008, Stockholm.

Clusters are not a new idea. The development of various kinds of clusters has been a priority for governments around the world for many years now; a 2006 study analysed around 1,400 cluster initiatives globally¹. Some are household names: think of Hollywood for the film industry, Bordeaux for winemaking, or New York for financial services. At their core, clusters are simply a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by various commonalities and complementarities². What is not simple, however, is understanding what gives clusters a competitive critical mass.

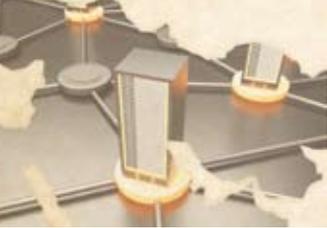
This report seeks to address this question by reviewing some of the approaches being taken within various clusters around the world. The aim is to outline a set of common attributes, while showcasing various ideas. It focuses specifically on innovation-led clusters, which involve some degree of R&D activity. The most commonly cited example for this is Silicon Valley in California, US, but there are many others, from biotech in Boston to Singapore's science park.

What is common across such places is that they have created a highly competitive and productive environment for businesses within a particular field. "What R&D theory shows is that the best way you can seed innovation is if all the stakeholders are in the same place," says Navi Radjou, a global innovation expert and fellow at the University of Cambridge's Judge Business School. "Having co-location of the different stakeholders accelerates knowledge-sharing and development of new products and services in a way that you can't do if they're scattered." In turn, these clusters start to act as magnets for leading individuals and businesses in a field, creating a self-reinforcing cycle.



Can governments create successful clusters?

A key question for many policymakers seeking to stimulate and develop such clusters is which role government can and should play. Many bemoan the role that over-active administrations try to play, not least by trying to outsmart the market and pick winners. But no cluster has succeeded without at least some input from government. At the very least, government has to provide an educated, healthy workforce in a stable, developing environment. Of course, most do far more. Many interviewees remind that Silicon Valley's initial growth came on the back of lucrative public sector contracts, for example.



Push or pull: Guiding principles for cluster development

Clusters vary widely in nature. The emerging Internet cluster in East London looks and feels entirely different to Taiwan's liquid crystal technology cluster within Tainan Science Park. Both are highly competitive in their respective fields, but have evolved very differently. London is a classic example of a bottom-up cluster that has fed off the city's creative talent, whereas Tainan was a government-led initiative set out in the 1990s to help revitalise the economy. This highlights the fact that there is no single blueprint for clusters: they form and evolve in different ways, based on local conditions and inputs. Nevertheless, there are some common points.

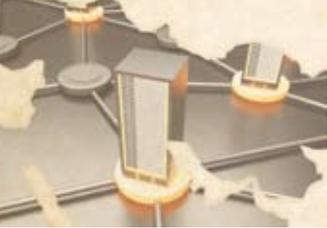
For one, nearly any industry can benefit from clustering, especially innovation-led ones. But as not everyone can build a world-leading cluster, it is crucial to focus on a specific niche. Ideally, cluster-planners need to identify and support existing activities. "You look for the grassroots signs of innovation taking place, and you accelerate that," says Eric van der Kleij, the CEO of Tech City Investment Organisation (TCIO), which works to develop London's technology cluster. Once an aim is set, government needs to cut away any barriers to competition. For example, if a region aims to develop an export-oriented cluster, then it should support that aim, for example by cutting trade tariffs or by adding new transport links.

Secondly, it is crucial to understand that clusters are about collaboration between people and organisations, rather than just having firms in the same location. While geographical proximity hugely aids the exchange of ideas, mechanisms need to be set up to facilitate this. Matteo Biancani, the project co-ordinator of GEYSERS, an EU R&D initiative that brings together the worlds of academia and industry, says that collaboration—both virtual and physical—is fundamental to his project's success. "Clusters are primarily built on collaboration and co-operation between private and public sectors," says Anne Lange, a director at Cisco and co-author of *Next-generation clusters: creating innovation hubs to boost economic growth*, a 2010 report.

Governments can definitely play a role in fostering such collaboration, says Göran Lindqvist, a cluster specialist at the Stockholm School of Economics. One simple example is by helping to invite firms to discussions and networking events. "Government can support offices, pay someone to be a cluster manager [who can] talk to suppliers, invite vocational schools and local government, and so on. It's not very expensive," he says.

Top-down or bottom-up?

This in turn gets to the heart of a crucial question: should governments drive clusters in a top-down fashion, or allow a bottom-up, market-led approach? There are strong arguments in both directions. Hermann Hauser, co-founder of Amadeus Capital Partners, a European venture capital firm, highlights that, while Silicon Valley was essentially a top-down cluster, the UK's Cambridge cluster is largely bottom-up. However, he says, "It's normally a combination of both." Singapore, Taiwan and South Korea are all examples of successful, government-led clusters (see case study *Singapore's long-term cluster development*).



Indeed, the weak state of the global economy is forcing the hand of many governments. Joan Bellavista, vice-president of the International Association of Science Parks, argues that models

CASE STUDY Singapore's long-term cluster development

For aspiring governments seeking to create a successful R&D cluster, there are few role models more inspiring than Singapore: a small city-state that has transformed itself into a thriving R&D hub. "This is a very encouraging point for others developing clusters. There is a role for government and government can do the right thing. And if they do, you can spawn such a cluster," says Lim Chuan Poh, the chairman of Singapore's Agency for Science, Technology and Research (A*STAR). But emulating Singapore's success requires a singular vision, supported over decades and co-ordinated across all branches of government.

The central plank has been the country's long-term investment in education and skills development. "The public sector has to invest in education and sustain this for a long time. You can't rush this," says

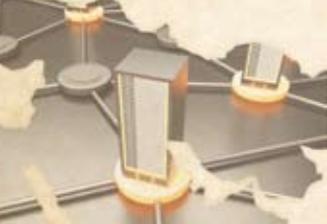
Mr Lim. Singapore has been making these investments for decades, with a specific push in the past ten years. This is increasingly bearing fruit, with growing private sector interest. "The private sector now far outpaces the public sector growth, which is a change from before," says Mr Lim. A recent SFr100m (US\$113m) investment from Roche in biomedical research is just one example.

Singapore also seeks to support all aspects of the R&D ecosystem. Mr Lim cites the example of trying to establish drug discovery. "It is one thing to have a great medical school, and one thing to have the government investing in this, but this is far, far away from actual drug discovery," he says. The country, therefore, works to develop all related elements: finance and venture capital; project management; technology transfer; skills; regulation; and so on. Much emphasis is placed on trying to ensure collaboration between all parties, but the central foundation is its talent pool. "If there is one thing that is important in all this, it is talent, talent and talent," says Mr Lim.

³Örjan Sölvell, *Clusters—Balancing Evolutionary and Constructive Forces*, 2009, Ivory Tower Publishing.

advocating strict market-driven systems have been "slightly decreasing" in influence recently, with interventionism increasingly prevalent. "The development of the knowledge economy and society is so important and so critical at the moment that we have no other option than leaving the market to invest as much as possible in these sectors and leaving the government to help as much as possible," she says. Nevertheless, while cluster initiatives can work with a government role, they can't work without a market role. This suggests a middle ground; cluster success is the result of a combination of evolutionary and constructive forces, as one report puts it³.

Naturally, any government seeking to develop a cluster has to tailor plans to its specific local conditions. There are many aspects to this, four of which are considered in this report.



Talent: The linchpin

First and foremost, successful innovation-led clusters are based on talent. “People are absolutely the critical ingredient,” says Charles Cotton, chairman of the Cambridge Phenomenon, which charts the region’s development as a technology cluster. “You need innovation, you need entrepreneurially minded people, who are prepared to take the risky path of setting up start-ups and spin-offs.”

Enrico Villa, the chairman of CATRENE, a European cluster for application and technology research on nano-electronics, says that the most important role government has to play is “that of human resources”, while ensuring the right mix of academia, the public sector and industry. This is a widely held view. Executives polled for this report cited the availability of specialist skills, from engineering to science, as the single most important factor for choosing where to locate an R&D centre. As such, a crucial role for government is in promoting education and skills development. This isn’t simply a matter of raising the number of graduates, but rather focusing on higher standards. “Quantity matters less—it’s quality that counts,” says Mr Cohn.

It is important to note that universities are less important for supplying ideas and technologies than for supplying specialist skills. Martin Smith, head of PA Consulting’s technology and innovation practice, says this is one of several cluster development myths. “[The notion] that university research is the only source of technology innovation is utter rubbish,” he says. “A good university is useful, particularly in developing competence and attracting talented people to go to that location.”

Attracting talent

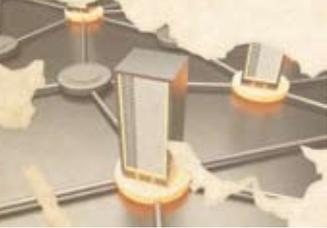
One potential way to accelerate the development of a cluster is to attract global research stars, or convince prominent expatriates to return. Wealthy countries in particular hold the ability to offer stars in a given sector access to big research budgets and a freer rein. This can certainly work. Mr Cohn, for example, notes that IBM’s R&D activity in Israel originated in the company’s desire to hang onto a star researcher, who happened to want to move to Israel. In another example, a pharmaceutical firm chose to set up its operations in Boston because of a specific expert located there who didn’t wish to move. Mr van der Kleij says one of the most important things his organisation does is “work to both develop and attract the talent to Tech City. This for me is fundamental.”

But the ability to attract prominent stars depends largely on less tangible factors, such as culture and quality of life, as the next chapter details. One alternative approach being trialled right now is to attract entrepreneurs through direct incentives (see case study *Start Up Chile’s fast-tracked innovation culture*). This has already inspired similar efforts in the UK, Greece and Italy.

Key lessons:

- ✓ Talent is the single most important factor to get right in developing a cluster
- ✓ Quality matters more than quantity

- ✓ Universities help provide the necessary supply of skills, but shouldn’t be looked to for actual technologies or innovations
- ✓ Finding ways to attract prominent researchers or industry names can help accelerate cluster development



CASE STUDY Start-Up Chile's fast-tracked innovation culture

One innovative fast-track programme aimed at developing a cluster of high-potential, globally oriented start-ups, and stimulating a culture of entrepreneurial spirit, can be found in Chile. Rather than building a science park or hi-tech corridor, the Start-Up Chile initiative explicitly seeks to attract ambitious early-stage hi-tech businesses from around the world by offering them US\$40,000 in equity-free funding, a free place to work, a one-year visa, business support and mentoring, and next-to-no strings attached.

The core idea is to attract a lot of talent to the country and connect that talent with local entrepreneurs, therefore kick-starting a local innovation and entrepreneurship cluster. "We don't want to replicate Silicon Valley, what we do want to do is transform Chile into a platform for going global," explains executive director,

Jean Boudeguer. It is a multi-year initiative, which aims to host 1,000 start-ups by 2014. Last year was a pilot, with 22 businesses participating. For 2011, nearly 1,000 have applied for 200 positions, hosted in two separate waves. Participating ventures are wide-ranging, from artificial intelligence for photovoltaic cells to a search engine for wine.

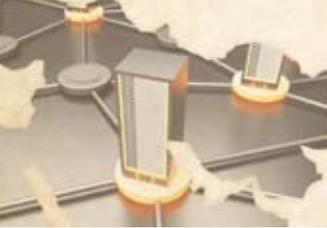
Rather than trying to get a stake in a future billion-dollar business, the initiative takes no equity in the young firms. This is a further incentive to participate, offering an alternative for founders ahead of giving away a stake to angel investors or venture capitalists. Instead, the programme presses participants to share their knowledge and energy, presenting workshops, attending events and networking meetings, contracting local talent, and so on. "What we're expecting from these entrepreneurs is to encourage the development of more start-ups and more globally minded entrepreneurs in Chile. We want to achieve an economic change through cultural change," says Mr Boudeguer.

Culture and quality of life

Innovation relies on people spotting opportunities and working to exploit them. But in countries where either the state or state-backed firms are the primary employers, this has a substantial bearing on local culture that can hinder innovation and entrepreneurship. "Culture is, in my personal opinion, a much more important phenomenon than we are conscious of," says Ms Bellavista.

In particular, governments need to remove any stigma of failure. "Most young companies fail, that's a fact of life," says Mr Cotton. "And failure is an important part of learning for most entrepreneurs." This is not necessarily difficult to address; changes in legal and tax structures to avoid onerous penalties for bankruptcy, for example, could alleviate the pressure on start-ups. But related to this should be the promotion and recognition of local champions that have bucked traditional careers. This is especially valid in certain countries, where entrepreneurs are often viewed negatively. "There is a perception that if you became an entrepreneur, you have failed. You are encouraged to go into a government position," says Mr van der Kleij. "It needs to be signalled very clearly from the top that entrepreneurship is something the country should be proud of." This is easier said than done, but in some countries, crisis can act as a catalyst for change (see case study *South Korea—promoting life outside the chaebol*).

Tolerance for differing views is also important. "Innovation happens at the crossroads of conflicting viewpoints," says Mr Radjou. "If everybody agrees, there's no innovation. It's when somebody says, 'I disagree with the status quo and I want to change it.' Innovation is synonymous with change. So if you want a catalyst of change, but if you don't tolerate change, for political or economic or cultural reasons, it's not going to happen."



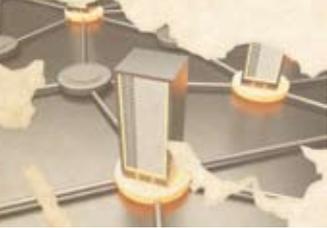
Competitive cities

Quality of life is also important. Most leading clusters offer compelling lifestyles: safety and personal freedoms; good schools and hospitals; a thriving cultural scene; and so on. Indeed, cities increasingly compete with each other to attract talent. This puts an onus on governments to create welcoming environments. “We wouldn’t choose to live somewhere where our family isn’t safe and happy, so the ability to ensure this is key,” says Mr Smith. This is also about job security, which is one benefit of a cluster. “People are willing to relocate to Cambridge because it has become a low-risk environment to do high-risk things in,” explains Dr Hauser. “If the company [the worker joins] doesn’t make it, they don’t have to relocate, because there is a cluster of them and they will find a job elsewhere.”

As it happens, a weak global economy, with a backlash against immigration in many advanced countries, provides an opportunity for those regions willing to be bold. If immigration opportunities are restricted elsewhere, an up-and-coming region could feasibly capture some of the talent.

Key lessons:

- ✓ Culture is a significant intangible factor that needs to be fostered and supported
 - ✓ Governments should recognise local champions,
- while removing stigma associated with failure
- ✓ A tolerance for differing views is another important cultural aspect
 - ✓ Providing an excellent quality of life is crucial for attracting global talent



CASE STUDY South Korea—promoting life outside the chaebol

Clusters develop from varying backdrops. Some aim for economic diversification; others come as a response to crisis. The late-1990s Asian financial crisis was the catalyst that forced South Korea to act. The economic turmoil prompted the collapse of 11 of its 30 largest chaebol (a conglomerate of companies clustered around one parent company) such as Daewoo, causing widespread unemployment.

These conglomerates had long been at the centre of South Korea's development policy⁴. As such, they were easily the preferred career choice for bright young workers. "The chaebol were the preferred employers; that was the ticket to success in society," explains Pedro Arboleda, a partner at Monitor Group. But the crisis gave a strong impetus for reform. This started with the tax code, for example by allowing families quickly to create businesses in their homes

and enter the tax system. Bankruptcy rules were also revised, so that failure wasn't penalised. Various other initiatives were also pushed, such as the rollout of ubiquitous high-speed broadband—South Korea now has the world's fastest and cheapest access.

But the biggest challenge was in changing local mind-sets, encouraging people that starting their own venture was culturally acceptable. "The government made a point of inviting entrepreneurs to key events and policy meetings, seating them next to the president, to literally raise the profile of such individuals in society," says Mr Arboleda. More recently, for example, initiatives such as Seoul's "Youth 1,000 CEO project" have been set up to encourage young entrepreneurs to think of alternatives to joining the conglomerates. But culture is deep-rooted, so efforts are ongoing. The obstacle is not a dearth of local talent, nor poor regulations, it's a society that "urges its best minds to aim low," suggests *The Economist*⁵.

⁴Sören Eriksson, *Innovation policies in South Korea & Taiwan*, 2005, Vinnova.

⁵South Korean entrepreneurs: young, gifted and blocked, *The Economist*, May 12th 2011

Policy and finance

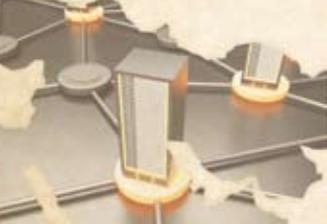
There is a huge amount that governments can do to reduce the barriers to innovation through policy adjustments. From tweaks to the tax code, to ensuring that company stock structures are in line with leading standards, along with basics such as the protection of IP and ensuring that visa and immigration processes are efficient. In some countries, such as Russia, governments are taking a radical approach, cutting through red tape in certain areas (see case study *Russia's Skolkovo hi-tech cluster: Tearing up the rule book*).

Revised rules can also encourage spinning out commercially promising organisations from clusters or from universities. "The government can then put in place the kind of [tax] structures that make sense both from the point of view of the investor, and the entrepreneurs themselves," says Mr Cotton. For example, governments can change company rules to allow for more complex stock structures. The aim here is to allow investor-friendly structures that protect and encourage early-stage investors. In general, experts recommend aiming to match global standards, making it as easy as possible for others to enter a cluster.

More broadly, governments need to ensure that a competitive marketplace exists, blocking monopolies from stifling innovation, for example, and facilitating good exit opportunities, either in terms of being able to list on a stock market locally or abroad, or allowing firms to be acquired by others.

Financing innovation

One key debate in the role of government is the question of how best to finance innovation. The general view is that investments should be matched by private funds, in order to add market discipline.



Fostering innovation-led clusters

A review of leading global practices

Mr van der Kleij gives an example from a “Launchpad” competition held in London, which offered ten £100,000 (US\$158,000) grants to companies for new research or product developments, but only if they could be matched by commercial investors. “I think [standalone grants] create an artificial economic stability that doesn’t endure,” he says. The Launchpad initiative ended up receiving 230 applications, prompting the organisers to double their initial investment.

Nevertheless, a more interventionist funding approach can work in the early stages of cluster development, if designed correctly. Israel’s government actively backed its local ventures before the emergence of a competitive venture capital community, for example. But the overall aim should be to encourage a private-sector-led financing environment. “Government should seek to create the right environment, rather than to invest in firms. Resource allocation is hard to do well,” reminds Mr Smith.

Key lessons:

- ✓ Governments have a range of policy tools at their disposal to improve the competitiveness of the business environment
- ✓ Key elements include: the tax code, reduced red

tape, ease of immigration, corporate structures, IP protection and increased competition

- ✓ While governments can provide financing, they should focus on investing in the overall environment
- ✓ Any investments should be matched by private-sector funds

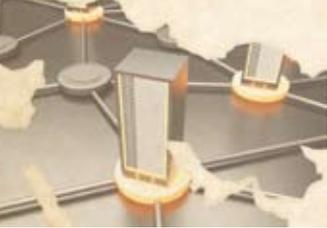
CASE STUDY Russia’s Skolkovo hi-tech cluster: Tearing up the rule book

In the development of R&D-led clusters, Russia faces a somewhat different challenge to many others. Owing to the legacy of its educational system, it is home to many highly skilled scientists, mathematicians and programmers. But this talent faces significant obstacles that block innovation and hinder the development of new businesses, not least stifling bureaucracy and engendering widespread corruption (Russia is ranked 154th on Transparency International’s 2010 world corruption index, well below Syria and Zimbabwe.)

To get around this, a new technology cluster is being created in Skolkovo, on the western outskirts of Moscow, which is being directly backed by the Russian president, Dmitry Medvedev. Many attributes are similar to those of other such global initiatives:

an advanced university is being created at its core; a partnership with the Massachusetts Institute of Technology to ensure quality education across various research areas; US\$5bn of government money, with equity-free, but co-financed grants provided for start-ups; and so on. What is unique, however, is its operating environment. “We have our own police force, our own administration, many Skolkovo-specific laws, our own intellectual property courts set up, so we’re creating a protected ecosystem that is necessary in Russia to nurture these very early-stage companies,” explains Steven Geiger, the chief operating officer of the Skolkovo Foundation.

It’s too early to see if this will work, but the hope is that this unique environment will help the country’s local talent create world-beating new companies. There are few local role models, says Mr Geiger: “If we can show that Sergey Brin can stay in Russia and become a billionaire, then we’ve got a lot of future Sergey Brins here in Russia.”



Infrastructure and local market

Many cluster initiatives start with grand infrastructure plans. This is not necessarily wrong, but clusters are not building projects, they're people projects. Dr Lindqvist cites an example of one cluster that essentially comprised a map, with allocated lots of land, planned motorways and rail and so on, but with no involvement from the businesses that were expected to set up there. "Clusters are about collaboration, not just putting firms in the same places," he says.

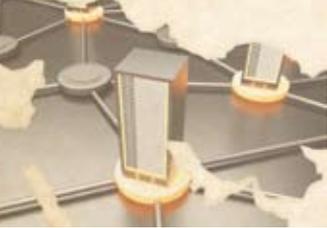
However, governments obviously need to ensure that basic infrastructure needs are provided for. Dr Lindqvist highlights a separate example of a cluster in Algeria, which was constrained by access to land—despite being surrounded by desert. The root cause was a policy aimed at developing agriculture, which imposed burdens on developers wishing to use the land for other purposes. "If you want to build a new district, you need to prove that the land cannot be used for agriculture," explains Dr Lindqvist.

The infrastructure investment that is most important is in the region or city itself, to ensure that all underlying factors—schools, clinics, transport options and so on—are in place. "The government has to step in to invest in infrastructure, access to airports, good schools, good amenities, hospitals," says Mr Radjou. "All the infrastructure has to be in place, because those things require a lot of money and only the government can do that." Even so, this development should occur with an eye on the region's needs; as some experts highlight, not all Middle Eastern countries should seek to emulate Dubai's efforts to create a global airport hub, for example.

Local pilot, global market

Another common cluster debate is the degree to which the local market matters. This is undoubtedly important for firms seeking to adapt their products and services to fit local needs; 37% of executives polled for this report cite the size of the local market as a key factor, second only to the availability of talent. In the Middle East in particular, this is seen as a primary driver for setting up R&D facilities. However, this isn't a prerequisite for global success. As Israel and Singapore show, even tiny local markets don't need to hinder global success (see case study *Israel's striking start-up success*).

Others add that what is more important than the quantity of demand is the sophistication of demand. "This is what drives [competitiveness]," says Dr Lindqvist. This doesn't imply that only wealthy consumers drive innovation, far from it; so-called "frugal innovation", for example, is similarly driven by the level of sophistication of the markets in which it emerges. "The local market is very important for the pilot. It's extremely helpful for start-ups to test their technology," adds Ms Lange.



Fostering innovation-led clusters

A review of leading global practices

Key lessons:

- ✓ Clusters should be seen as people projects, not building projects
- ✓ Governments should primarily develop the overall environment: schools, transport links, and so on.
- ✓ A large local market can help to attract corporate R&D investment, but isn't a prerequisite for the success of a cluster

⁶Dan Senor & Saul Singer, *Start-Up Nation: The story of Israel's economic miracle*, 2009, Twelve.

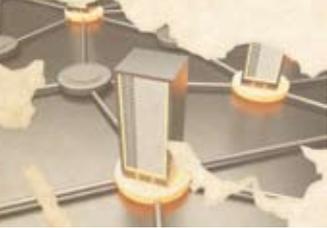
CASE STUDY Israel's striking start-up success

One of the most striking cluster success stories is that of Israel. It boasts the world's highest number of start-ups per capita, has the highest rate of civilian R&D spending per capita, and attracts more venture capital spending than France and Germany combined.

Israel has achieved this without world-class infrastructure, and without a major local market. "We have an almost insignificant local market, so it looks like a big weakness, but it's actually a source of strength," says Oded Cohn, head of R&D at IBM Israel. "When you have a local market, you are tempted to serve this local market first, and then worry about the rest of the world later. In Israel, even before the need for going global was [widely accepted], we

were forced to connect to other markets." Mr Cohn believes that the country's infrastructure doesn't matter much either: "There's lots of innovation based on infrastructure, but it doesn't have to be the best. Sometimes it helps you; if you don't have any traffic jams, you don't come up with mobile solutions for these."

The root causes of Israel's development of an R&D powerhouse can't be pinned down on any one reason. One book, *Start-Up Nation: The story of Israel's economic miracle* (Senor & Singer, 2009)⁶, proposes a range of theories, such as the country's mandatory military service. This not only gives skills to the country's youth, but also a sense of responsibility and risk-taking. "Once you have some experience of risk in your life, in terms of actual life, then investing effort or money in a start up becomes relatively easy," says Mr Cohn.



Pitfalls: What causes clusters to fail

There are numerous pitfalls commonly associated with failed clusters, often the result of unintended outcomes from well-meaning efforts. Unfortunately, they usually involve a waste of public funds. Three common examples are:

Investing in white elephants. It's easy to waste money, not least by investing in high-prestige projects that make little market sense, "what the Italians call *cattedrale nel deserto*—cathedrals in the desert," says Dr Hauser. In 2005, for example, Malaysia opened the huge BioValley biotechnology complex, but without first assessing what demand there was for such a facility; it is largely empty today⁷. Mr van der Kleij believes this is an ego problem: "The principals behind the cluster want a trophy, rather than a genuine cluster."

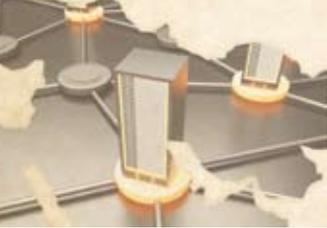
Investing without any market fundamentals in place. Backing ventures without any obvious market fundamentals is another common issue. "I think the main reason why clusters fail is because there's been a government mandate in areas that shouldn't have a cluster in the first place," says Dr Hauser. In many examples, good intentions have been led awry, not least by various stakeholders trying to grab a slice of the pie. One example is in Massachusetts in the US. A US\$1bn 2008 initiative aimed at developing life sciences controversially allocated US\$49.5m to a local college of liberal arts—a school with no graduate science programme⁸.

Trying to pick winners. While usually done with the best of intentions, identifying the future Googles and Facebooks of the world is hard. But many governments love to try to pick local winners. One recent example was a failed US\$1.6m attempt in Michigan to invest in a hybrid vehicle start-up, which the state had hoped to champion as a success story for its development programme⁹. The firm ultimately went bankrupt, despite active state backing, after failing to convince private investors of its merits.

⁷Josh Lerner. *Boulevard of broken dreams: Why public efforts to boost entrepreneurship and venture capital have failed—and what to do about it*, 2009. Princeton University Press.

⁸"Backers cry foul on science legislation", *The Boston Globe*, May 20th 2008.

⁹"Green bus biz fails: Government planners pick a loser...and stick with it", *Michigan Capital Confidential*, August 1st 2011.



Conclusion

The appeal for governments of trying to create innovation-led clusters is clear, but getting it right is hard. Cluster development is a long-term effort, usually measured in decades. In the UK, Cambridge is now recognised as a successful technology cluster, with around 1,400 firms. But even with a built-in advantage of an 800-year-old university at its core, it has taken decades to get there; its first science park was built in the early 1970s. Silicon Valley as we know it has been developing for over a century.

Some argue that this process is shortening, owing to globalisation and advances in technology. Taiwan's cluster initiatives only formally launched in the 1990s and are now successful in several sectors. But they were built on existing efforts to develop skills and education—the fundamental linchpin. As the first report in this series highlighted, building a global hub for R&D in the Middle East will not happen overnight, not least because of the need for a strong supply of local talent. But the fragile economies of many advanced countries create an opportunity here. Top scientists, researchers and entrepreneurs are highly mobile, while immigration policies in many countries are being tightened. With sufficient incentives, this global diaspora of talent could be attracted to help accelerate cluster development.

Doing this will require wide-ranging and co-ordinated efforts, as this report has detailed—from improved quality of life and better immigration processes to carefully structured funding and a revised tax code, to name a few. But securing a globally competitive base of talent will be fundamental in helping the Middle East recapture its historical position as a global hub for innovation.

While every effort has been taken to verify the accuracy of this information, neither The Economist Intelligence Unit Ltd. nor the sponsor of this report can accept any responsibility or liability for reliance by any person on this white paper or any of the information, opinions or conclusions set out in this white paper.

GENEVA

Boulevard des Tranchees 16
1206 Geneva
Switzerland
Tel: +41 22 566 24 70
E-mail: geneva@eiu.com

LONDON

25 St James's Street
London, SW1A 1HG
United Kingdom
Tel: +44 20 7830 7000
E-mail: london@eiu.com

FRANKFURT

Bockenheimer Landstrasse 51-53
60325 Frankfurt am Main
Germany
Tel: +49 69 7171 880
E-mail: frankfurt@eiu.com

PARIS

6 rue Paul Baudry
Paris, 75008
France
Tel: +33 1 5393 6600
E-mail: paris@eiu.com

DUBAI

PO Box 450056
Office No 1301A
Thuraya Tower 2
Dubai Media City
United Arab Emirates
Tel: +971 4 433 4202
E-mail: dubai@eiu.com