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Emerging Trends in Infrastructure

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A vision for the future

On the streets, on social networks and at the ballot box, people are voicing their discontent. They are worried about the environment. They are demanding social equality. They are advocating for better living and working conditions. And they are reacting to perceived institutional injustices. In short, they are angry at their leaders and they are making sure their voices are heard.

This is not about a handful of radicals shouting from the wilderness. What we are witnessing is a massive shift in the 'middle'. Indeed, the voices on the fringes of these issues largely remain shrill and extreme. What is changing is the quiet chorus of voices that make up the middle ground (i.e., the average voter).

For many governments, this upswelling of discontent could not be happening at a worse time. Public budgets are highly constrained (either by debt or by borrowing limits). Technologies are rapidly changing. New risks are emerging. And planning is becoming infinitely more complex. The pace of response from governments is proving to be inadequate.

To make matters even more challenging, we are also in the midst of a fundamental rebalancing of global dynamics as the dominance of established markets starts to wane and new — often emerging — markets start to wield greater influence on a range of important issues.

The impact of these trends on the infrastructure sector will be significant. Long-term planning and investment will become increasingly challenging. Capital flows and investment models will rapidly shift. Technologies and assets will unexpectedly become obsolete. And, all the while, the public will continue to call for change.

For those with a vision for the future, there will also be significant opportunities. Evolving risk perceptions and realities are creating amazing investment opportunities for those who know where to look. Technological change is creating space for less developed markets to leapfrog the mature markets. Data and analytics (D&A) is translating the voices in the street into usable, reliable information about the public's expectations.

The trends we chose to highlight in this year's edition of *Emerging Trends in Infrastructure* are not fanciful or the stuff of science fiction. Indeed, many of the biggest trends influencing the sector this year will be things we have been talking about for years: sustainability, risk, investment flows and socio-political change, for example.

What makes this year's predictions different, however, is that the same pernicious trends are now becoming intertwined and interdependent. The pressures driving them, and the force of the public opinion surrounding them, are becoming overwhelming. Forming a sustainable response is becoming increasingly challenging.

We believe that — to retain some level of control in this rapidly evolving environment — governments, investors, developers and operators will need to move quickly to respond and reform. New listening skills will be critical and new ideas will be required. We hope this edition of *Emerging Trends in Infrastructure* helps inform that thinking.

Richard Threlfall
Global Head of Infrastructure
KPMG International
E: richard.threlfall@kpmg.co.uk
Richard Threlfall
@RThrelfall_KPMG

Stephen Beatty
Global Chairman (Non-Exec), Infrastructure and Head, Global Cities Center of Excellence
KPMG International
E: sbeatty@kpmg.ca
Stephen Beatty
@stephencbeatty

Julian Vella
Asia Pacific Head of Infrastructure
KPMG International
E: julian.vella@kpmg.com
Julian Vella
@jp_vella

Michele Conolly
Head of Infrastructure & Government
KPMG in Ireland
E: michele.connolly@kpmg.ie
Michele Connolly
@michelec_kpmg

As we enter a new decade and an election cycle, we face an era of unprecedented change. This change will see us face ongoing uncertainty (which is the new normal) and present new challenges to be overcome. It will also offer opportunities to build on our significant growth over recent years in an optimal manner to secure a strong bedrock for the future. We continue to have legacy issues with segments of our infrastructure which is particularly evident in the provision of health, housing, education, public transport and water. The public are not accepting the historic under-investment in our critical services and policies such as Project Ireland 2040 and the Climate Action Plan are showing that the government is starting to listen. The delivery of these plans and policies will be critical for the economic and social prosperity of our country over the next 30+ years.

In early 2020 we will see a general election in Ireland which will set the tone for a critical period in our progress as a State. We are likely to see policies of change, directly related to infrastructure, high up the agenda. In our annual publication we set out the global Emerging Trends in Infrastructure, how they are likely to play out in the coming months ahead and their relevance to our nation.

We hope you enjoy the publication and that it helps inform your thinking whether you are in government, an investor, a developer, an operator or an interested observer.

Trend 1:

Society finds its voice

In the year of an election, candidates are well versed in listening to their constituents. However, in this era of social media and instant feedback government candidates and parties will have to take a customer-centric approach to their messages and manifestos, promising deliverable and achievable policies. Now more than ever, over promising and under-delivering will be quickly found out and is unlikely to provide for a stable government. In particular, voters will want to understand how the next government will solve crises in housing and health both of which involves delivering critical infrastructure.

The world is reverberating with popular demand for change. From the coordinated climate actions held by citizens around the world to protest marches on the streets of Hong Kong, Santiago, Bogota, Tehran and London, society is voicing its discontent. Governments will need to start listening if they hope to understand and address the root causes.

Climate change took center stage this past year, perhaps best epitomized by Greta Thunberg's 'dressing down' of world leaders at the UN. But it is not the only issue driving social discontent. The protests in Chile started as a student action against high bus prices. The riots in Tehran were sparked by increases in energy prices. Plans to reduce fuel subsidies led to days of unrest in Ecuador. Infrastructure is a common theme.

This isn't just a series of isolated incidents and failures. What we are seeing is people expressing their disillusionment with their government institutions and their public leadership. Social media and smartphones are helping to give many citizens a new voice, allowing them to coordinate and express their frustration. They are not waiting for the next election to make their feelings known (although ballot box results are, in many cases, asking for profound change).

Unfortunately, many governments have been caught on the back foot, unsure how to respond. Some have attempted to maintain the status quo by labelling the protesters as disgruntled and skirting the issues. Others have thrown their lots in with the protesters, in an attempt to placate voters and polish their credentials.

Government's primary role is to be a good steward of their country's future. The problem is that balancing the needs and expectations of the current generation with the responsibility and sustainability owed to future generations is becoming more complex and controversial. Both the medium and the message have changed.

Finding that balance will require governments to be better informed, more forward-looking and consultative, leveraging new approaches and new technologies that make public expression/consultation much easier, more cost effective and timelier. They will need to start tapping into non-traditional feedback channels like social media while addressing deep-seated concerns about privacy. Governments will need to improve their mastery of data and analytics if they hope to remain true representatives of the people.

Look back: What did we predict?

In 2019, we predicted that "consumers [will] seek a larger voice in their infrastructure options… future infrastructure plans will need to be informed by real-time and predictive customer insights rather than historical patterns and expert opinion."

Yet it is not just citizen needs that have changed. It is also their expectations. As consumers, citizens are seeing massive improvements in personalization and customer-centricity. They expect the same from their governments. Leaders will need to rethink the role that governments play in citizen's lives, moving away from department-by-department transactional relationships and towards a much more holistic, citizen-centric environment.

More than anything perhaps, governments will need to do a much better job of listening to people, interpreting the signals and understanding the root causes of their discontent. They also need to be articulating and explaining the decisions they make and the policies they develop. Citizens need to be able to understand and buy into the complex choices that are being made and the rationale that supports them. This will not only bring greater transparency, it will also help inform the discussion, improve the quality of debates and, perhaps, quell some of the public discontent.

Denying the problems will not make the protestors go away; don't expect the social discontent being played out on the streets and on social media to cease any time soon. But do expect many governments to start seeing this as a wake-up call that creates an opportunity to improve the way they make decisions, serve citizens and deliver a better quality of life for all.

Trend 2:

Putting infrastructure resilience and safety first

Ireland's infrastructure assets have traditionally been quite resilient. However, we have seen issues in recent years such as the leaking of sewerage from Irish Water treatment plants into Dublin Bay, cyber attacks on HSE infrastructure and storm damage to utilities infrastructure. Providers and operators of infrastructure are developing new techniques to manage these assets in a safer more secure way, analysing data, utilising artificial intelligence and developing cyber security policies to mitigate disruptive risks.

In a rapidly-evolving risk environment, many are asking whether their infrastructure assets are safe enough and resilient enough. The public's awareness and interest have never been so high.

Recent events suggest that they might have good reason to worry. Many of the wildfires that ravaged California were thought to have been contributed to by poorly maintained power lines and worsened by climate change; local distribution companies were forced to shut down services to communities when the wind blew too hard.

Other infrastructure failures have also shaken confidence; the Genoa bridge collapse in Italy, the failure of the Brumadinho tailings dam in Brazil, the two fatal passenger aircraft crashes due to technology malfunctions, an unknown number of data breaches and cyber-attacks, countless rail and road accidents — it's not surprising that people are feeling less confident about the safety and resilience of their infrastructure.

As a result, we are seeing governments and asset owners begin to put a much larger emphasis on safety, maintenance and resilience, right across the asset lifecycle. These factors are also finding their way into investment decision-making.

From new asset management standards at the local level to global initiatives such as the Coalition for Climate Resilient Investment announced at the most recent UN Climate Action Summit, asset owners are feeling pressure from the public for improved resilience.

Resilience, at its core, is the ability to reduce the likelihood and impact of 'extreme' events. These events represent 'disruptive risk', which is a risk so severe that it threatens the long term survivability of the asset or business. Typically, events that turn into disruptive risks are initially identified as high-consequence risks, but the expected low probability of the risk occurring does not usually precipitate the necessary business planning required for deploying appropriate mitigations. However, as forces drive the probability of these events higher (i.e., climate change, aging assets, increased urbanization), a business lacking planning for the extreme event is potentially exposed to the full consequence of the risk. Thus, this results in disruptive risk for the business and the need for resilience planning. Because disruptive risks are often ambiguous, complex, and difficult to identify, assessing and responding to them requires enhancing certain capabilities within an organization.

Becoming resilient starts by aligning the business planning preparations needed with a wider vision that encompasses the business's strategy, mission, vision and values while addressing vulnerabilities. These preparations can be put in place by developing formal structures such as reporting lines and committees specifically charged with implementing resilience strategies. Leading organizations utilize data to identify and evaluate risks and propose solutions. And ultimately, a resilient business must make risk-informed investment planning decisions that prioritize capital deployments to mitigate disruptive risk in an efficient and timely manner.

Pressure is also being applied by investors, who are becoming increasingly concerned about the growing range of risks they face (see Trend 3, Risk perceptions and realities change, for more on this). And that, in turn, is forcing asset owners to think much more seriously about how they are identifying, measuring and managing their risks.

This year, expect to see asset owners and investors continue to go beyond traditional asset management approaches to instead think much more holistically about how they ensure ongoing safety and resilience across the asset lifecycle.

Trend 3:

Risk perceptions and realities change

The perception of and approach to risk in the Irish market is evolving slowly. This is particularly evident, and consistent with the global trend, in the construction sector. Ireland's construction sector is led by a small number of large players and a large number of small to medium size enterprises. The majority of these companies earn very low margins and do not have significant capacity to invest in technology and innovation. If we are to deliver on the infrastructure plans for Ireland this approach will have to change.

Say goodbye to everything you thought you knew about risk. We are seeing significant changes in the way risk is both perceived and managed.

In the past, perceptions of risk were largely based on some time-tested historic fundamentals. Investors trusted certain truisms — OECD markets were inherently low-risk; emerging markets were high-risk, for example. But no more. In today's environment, few of these notions remain valid. The fundamentals are unreliable. The macro 'rules of thumb' now serve only as the barest of guides; objective due diligence has never been more important.

The problem is that — while the ground shifts underneath the historic risks — we, as an industry, are facing a set of evolving risks that must now be much better understood and managed; cyber risks, technology risks, political and social risks, funding and financing risks, to name a few. These risks increasingly require a much more sophisticated (and analytical) approach if managers hope to fully understand and measure their potential incidence and significance.

On the positive side, these tectonic shifts in the world's risk environment are creating new opportunities for those looking for higher margins. As we note in Trend 4 (Winds of globalization blow from the East), infrastructure capital and capabilities are flowing into new markets and new sectors as investors look to take advantage of the gap between risk perceptions (which influence pricing) and risk realities (which influence rewards).

On the negative side, construction companies are getting squeezed as risk/reward ratios shift and margins come under further pressure. This, in turn, is limiting construction companies' ability to reinvest into innovation, capabilities and technologies, thus undermining their longer-term viability.

In fact, in the most recent Global Construction Survey, KPMG International found that only 1-in-5 construction companies were properly investing in innovation; an equal number admitted they were doing nothing at all while the vast majority essentially said they were playing around the edges. The future risk seems increasingly worrying.

Look back: What did we predict?

In 2019, we predicted that "a growing number of infrastructure players are looking to emerging markets for new opportunities — and better yields and margins."

As the weakness of the construction sector becomes clearer, expect to see more governments follow the lead set by markets such as the UK, Australia and Hong Kong, where policy makers are actively implementing programs aimed at improving the future resilience of domestic construction companies. More emphasis will come as more infrastructure owners, both public and private, realize it is in their interest to proactively support and invest in the health of their construction supply chains.

Over the coming year, we also expect to see significant changes in the way that risk is measured and managed. Rather than allowing received wisdom to inform decisions, infrastructure providers, investors and owners will start to leverage predictive analytics and scenario planning as ways to create robust forecasts of future trends and expectations. Much more sophisticated use of data and AI-driven decision-making will also help mitigate risks.

Our view, however, suggests that the greatest changes will come in the perception of risk. Indeed, as executive management, risk managers and investors start to use data and analytics to achieve a better understanding of their risks, we expect to see much greater alignment between risk perception and reality, thereby addressing an issue we have been deeply concerned about for several years.

As this happens, don't be surprised to see a handful of fast-movers start to reap disproportionate rewards as they use their proprietary risk insights to uncover new and highly-profitable opportunities ahead of their competitors.

Trend 4:

Winds of globalization blow from the East

In 2017 Ireland together with 12 other nations joined the Asian Infrastructure Investment Bank to assist infrastructure development in the region. In terms of trade and development, Asia is critical to Ireland's economic growth and this is seen in the Government's Global Ireland policy where it seeks to double Ireland's impact globally. In addition, we are seeing increasing inbound interest from Asian investors, banks and funds in the Irish market as links between Ireland and countries such as China, Japan, India and Indonesia strengthen.

As markets in the West continue to turn inwards, Asia's markets (led by China and India) are turning outward. While North America, Europe and South America talk about building walls, Asia is talking about building bridges.

In part, the shift towards the East is being driven by some of the issues discussed in the previous trend (Trend 3, Risk perceptions and realities change) — capital is moving towards places and projects where greater margins can be achieved adjusting for risk. Significant injections of capital into Belt and Road Initiative projects by China's state-owned enterprises, banks and investors will increasingly draw money and capabilities to the East.

Yet, at the same time, many governments and development banks across the region also recognize that investment continues to be constrained by low levels of transparency, sophistication and project planning in many markets.

As the Asian Infrastructure Investment Bank (AIIB) noted in a recent report on infrastructure investment across eight Asian markets, "There is an urgent need to redouble efforts to mobilize private capital, and these would include improving project preparation, improving country policy framework, and sustaining the supporting conditions such as through better information for market players."[1]

The good news is that — again, led by China — infrastructure capabilities are starting to mature across the region. As a way to increase private capital participation and partly in response to growing demands for more competitive tender processes within target markets, China is working with its state-owned enterprises and infrastructure developers to gradually improve their focus on high-quality, sustainable and financeable infrastructure projects.

China is also driving innovation across the value and delivery chain. Indeed, when you consider the massive scale of China's construction industries and the market's rapid evolution in high-tech capabilities, we would be surprised if China does not surpass the West in a number of construction capabilities over the coming year (more on this in Trend 8, Infratech tilts the balance).

We are slowly starting to see the effects of increased innovation and internationalization ripple across the region as sophistication steadily improves across the delivery and supply chain — from planning and development through to financing and operations.

In China and across the region, much more will need to be done. As the AIIB report also noted, while expectations for private financing into Asia-Pacific have been high, actual levels have been falling since 2016. Continued macroeconomic pressures in many markets may further dampen investment over the coming year.

While the fruits of this trend will take some time to materialize, our view suggests that the winds of globalization will continue to blow from the East. And the force of those winds will only increase as greater sophistication, innovation, transparency and competition is achieved. It may take some time for some to feel the breeze shifting.

[1] https://www.eiu.com/graphics/marketing/pdf/Asian-Infrastructure-Finance-2019.pdf

Trend 5:

The corporate world (finally) embraces sustainability

Much like the trend globally, Irish companies large and small, are waking up to the fact that ESG is not just a nice piece of reporting in annual financial statements. We are seeing semi-state companies implement more sustainable strategies while a number of Irish plc's and private companies are doing similar – with the comment that many will need to adapt in order to survive, let alone thrive.

Last year, we noted that sustainability had started to become embedded into public consciousness. And we argued that governments and corporations would need to move quickly in response. Recent climate protests suggest there is still a lot of work to be done.

Some corporations have become lightning rods in the climate debate. Extractive industries, in particular, are in the firing line — not only from protesters flinging red dye at company headquarters, but also from governments seeking redress for the costs of dealing with climate change. The activities of groups like Extinction Rebellion and the People's Climate Movement only reinforce that society now expects more from their governments and corporations.

The good news is that corporations are now starting to embrace the sustainability agenda, and more specifically the concept of decarbonization. This past September, 87 major companies representing more than USD2.3 trillion in market capitalization committed to support the 1.5 degree goal set out at the Paris climate talks. Many are making significant investments towards reducing their carbon footprint across the supply chain.

Even the extractive industries are getting in on the action. We are aware of a number of oil producers, coal extractors and miners who are switching the power source of their production facilities over to sustainable energy sources. Many are also investing into new, 'cleaner' revenue streams in order to diversify their portfolios away from non-ESG (Environmental, Social, and Governance) compliant assets in the future.

While initiatives by individual companies and industry groups are encouraging, we expect changes in the financial markets to provide the greatest catalyst towards wide-spread corporate adoption of ESG criteria this year.

Indeed, it seems the financial markets are passionate about sustainability and in particular, they are focusing on corporates with clearly defined decarbonization strategies. According to recent data, the so-called 'Impact Investing' market is now estimated to be worth more than USD500 billion. Another USD500 billion has been invested into Green Bonds to date. And that's just a small slice of the action. At the start of 2018, global sustainable investing assets in just 5 major markets was estimated to have reached more than USD30 trillion. ESG performance is similarly becoming part of mainstream decision-making.

This should be sobering news for those infrastructure owners dependent on non-ESG compliant assets and revenue streams. The reality is that, as the trend towards ESG investing continues, owners and promoters of these assets and projects will find it increasingly difficult to secure funding and financing at reasonable rates. Over the next few years, we believe it is inevitable that significant value in non-ESG compliant assets will become stranded or lost.

While the shrill voices at the extremes will persist, we are seeing a significant shift in the 'middle.' The mainstream corporation and investor now understand the strategic importance of addressing this issue. This year, expect them to evolve themselves and to push governments towards action. Where government inaction is insurmountable, don't be surprised to see more private interests taking infrastructure planning and decision-making into their own hands.

Look back: What did we predict?

In 2019, we predicted that "the coming year [will] bring more public pressure and scrutiny on the sustainability of infrastructure planning, delivery, maintenance and funding as attitudes around the globe continue to shift."

Trend 6:
Planners and consumers align

Project Ireland 2040 includes capital projects and programmes from the low millions up to the billions. A number of the larger projects in the plan have gone through extensive public consultation. While time consuming and perhaps not always optimal, it is important for authorities to gain insight, consult and listen to the customers and public affected by such projects. But, as the trend points out, such consultation needs to be made in the broader context of long-term infrastructure planning.

As areas once dominated by government services and infrastructure become increasingly decentralized, governments are having to rethink their longer-term plans. Expect to see greater focus on aligning the 'micro' decisions of technology-enabled consumers with the 'macro' decisions being made by infrastructure planners and decision-makers.

The decentralization of infrastructure is not a new trend, but it is rapidly picking up pace. Consider, for example, the widespread adoption of ride-sharing; the spread of decentralized consumer power generation sources; the shift towards more 'circular-economy' waste practices. New models that put the consumer in the driver's seat continue to emerge.

While many governments are keen to encourage this type of innovation — in part to meet evolving consumer demands and in part to reduce their own investment requirements — the shift away from the more traditional 'command and control' macro approach is creating some difficult long-term planning challenges.

In particular, some governments and infrastructure planners are struggling to understand how these new economy models will influence the value and usefulness of their existing 'old school' assets and services. Will the falling price of home solar kits eventually result in stranded generation assets? If so, how quickly will demand drop? Who will be the residual supplier? How will they be compensated and what role will government play in ensuring/providing a level of 'baseline' services? Some are asking themselves if they should be investing any taxpayer dollars into a centralized energy grid at all.

As noted in Trend 1 (Society finds its voice), governments will need to become much better at understanding and responding to consumer preferences, needs and expectations.

Look back: What did we predict?

In 2019, we predicted that "infrastructure authorities and planners [will] move towards more holistic and evidence-based decision-making processes… to deliver on society's needs and expectations."

Evidence-based decision-making and continuous public consultation/listening/engagement will be key to understanding future trends and demand.

Yet government will still need to take the lead: few citizens truly understand the full breadth of considerations that go into long-term planning. Basing decisions purely on what the data says citizens want today is not a recipe for long-term growth and sustainability. Infrastructure plans must be made within the broader context.

Over the coming year, expect to see governments investing more time and effort into understanding how these trends are influencing behavior and how that, in turn, is shaping demand. The more advanced markets (in this regard) are already creating long-term strategies that balance new models against existing traditional asset investment and planning expectations.

Ultimately, this should lead to much greater alignment between the micro decisions being made by consumers and the macro ones being made by governments. Whether that will be enough (or will happen quickly enough) to satisfy the public's demand for greater influence is anybody's guess.

Trend 7:

Emerging markets embrace private finance

Similar to the U.K. and other developed countries, we have seen a decline in the number of Public Private Partnerships in the Irish market. And while the availability of private finance in infrastructure has never been stronger there are less opportunities for private infrastructure investment in Ireland. As such, Irish finance providers are looking at wider non-traditional infrastructure opportunities and also opportunities in emerging markets. However one would also still ask the question – are we missing an opportunity to correct our infrastructure deficit faster through not taking advantage of private finance?

Read almost any newspaper in London these days and you'll quickly notice that Public-Private Partnerships (PPPs) are under attack. If you listen to the pundits there, you'd think that all PPPs are financially unsustainable, inflexible and designed purely to line the pockets of greedy investors. Similar push-back is being felt across other developed markets.

But in the emerging markets, private finance has increasingly been hailed as essential to driving the pace of investment that is needed to meet countries' aspirations for economic growth and quality of life.

In part, this is being driven by concerns about affordability at the government level. Few emerging markets have access to all the capital they require to fund their infrastructure needs through public sources. As António Guterres, UN Secretary-General, noted in a recent article he wrote in the Financial Times, "Public resources from governments are simply not enough to fund the eradication of poverty, improve the education of girls and mitigate the impact of climate change." The emerging markets understand this better than most.

At the same time, many emerging markets are now seeking to encourage some level of competition in infrastructure procurement. The reality is that, while there has certainly been increased foreign investment into many emerging market infrastructure projects over the past few years, the vast majority has been conducted with a high degree of government-to-government involvement.

Now emerging market governments are starting to get serious about creating the right preconditions for encouraging real competition and sustainable private investment.

Egypt, for example, is in the midst of updating their PPP laws as a way to drive funding to major projects.[2] Indonesia recently opened up their urban transportation development sector to private investment.[3] In Malaysia, the Finance Minister is pushing a drive towards what is being called 'PPP 2.0'.[4] As we noted in our most recent edition of Insight Magazine, many East and Central African governments are also making great strides towards opening up their infrastructure sectors to private finance.[5]

That is not to say that all emerging markets are moving in the same direction and at the same speed. Despite their best hopes, a number of them simply lack the institutional preconditions to attract real private investment — security, rule of law and contract certainty, for example. Others are allowing populist agendas and a general lack of regard for future debt sustainability to fuel large governmental spending projects and to maintain subsidies that undermine competitive markets.

However, we see an overwhelming shift towards the institutionalization of private investment in infrastructure within the emerging markets. Over the coming year (and more), expect to see more emerging economies start to open as governments look for ways to better manage their debt sustainability while also improving competition and, hopefully, transparency.

Look back: What did we predict?

In 2019, we predicted "an increasing, and important, focus on improving the 'bankability' of emerging market opportunities by creating more rigor in the ways projects are prioritized, selected, developed (by undertaking more robust technical and financial feasibility analyses), 'de-risked' and procured."

[2] http://viewswire.eiu.com/index.asp?layout=VWArticleVW3&article_id=298284213
[3] https://www.businesstimes.com.sg/asean-business/indonesia-accelerating-urban-transportation-development-with-public-private
[4] https://www.partnershipsbulletin.com/news/malaysia-govt-backs-ppp-model
[5] Watering the green shoots: Africa's evolving PPP environment, Insight Magazine, 2019, KPMG International

Trend 8:
Infratech tilts the balance

As a small economy with so many large tech companies headquartered here, a young educated population and centres of research and development, Ireland is extremely well placed to innovate and provide for a technological revolution in infrastructure. We are already seeing this in the number of tech companies that exist under emerging infrastructure industries such as connected and autonomous vehicles, smart cities and wider transport mobility. In addition, we have seen the completion of the National Broadband Plan which, once implemented, will see high speed broadband across Ireland, something that has not yet been achieved in Europe. This, together with the provision of 5G by telecoms providers, has the potential to benefit health, education and the wider economy in the years ahead.

One could devote pages to making predictions about the future of Infratech: new technologies will be developed and commercialized; exciting new digital interfaces and apps will be launched; impressive cloud-based enterprise systems will reduce costs; innovative new technology-enabled models will be tested. The list of potential and likely scenarios goes on.

What will be notable this year, however, won't be the quantity or the aspiration of individual announcements, pilots and tools, but rather who is making them. Once again, expect the center of gravity to start moving towards the emerging markets.

This year, for example, India is due to start construction on the world's first commercial Hyperloop line. If things go as planned, the next decade will see Indian companies and engineers create a massive new center of excellence based on an entirely new and innovative technology.

China is taking the same approach across a number of different technology sectors. The country has already virtually cornered the solar technology market and the 5G telecoms market. And they are making significant leaps forward in new and emerging areas like AI and robotics. With hegemony over each new technology comes new skills, capabilities and opportunities.

Similar stories, albeit on a smaller scale, can be found across the emerging markets — in the tech hubs of Malaysia and Kenya, in the Smart Cities of Indonesia and Saudi Arabia, in the new digital service models being developed in Nigeria and South Africa.

Look back: What did we predict?

In 2019, we predicted that "the competition around new technologies [will] intensify as players continue to look for new opportunities to improve their services, products and revenues."

Free from legacy infrastructure, models and regulation, it is these markets that are driving the Infratech agenda.

The gap seems set to widen over the coming year, somewhat worryingly for the mature markets. Innovation tends to have a network and cluster effect; leadership in one enabling technology (say, China's leadership in 5G equipment and development) tends to unlock capabilities in other areas (in this case, the development of automated vehicles). The faster the emerging markets innovate, the faster they will leave the West behind.

Over the coming year, expect to see the emerging markets start to develop entirely new approaches to solving their infrastructure challenges. And expect the mature markets to start asking themselves how they should be responding to the same stimuli. Those who ignore this new model of technological evolution do so at their peril.

Trend 9:
Small becomes beautiful

While the headline projects for Ireland tend to be the mega projects (NCH, NBP, Metrolink etc) the reality is that the majority of these projects will be delivered in the medium to longer term. However in our growing economy we are also seeing an immediate infrastructure need across all sectors many of which will offer opportunity for medium sized business to get involved. Involvement of SME's is harder to action. Government funds such as the Climate Action Fund and the Urban and Rural Development Funds go some way to facilitate this. There is also a need to promote the opportunity for those businesses to partner with larger parties.

Were megaprojects just a fad? For a few years it seemed that big projects were the best solution to many of society's big problems. That logic is being reconsidered.

The delays, cost-overruns and disruption associated with the massive size and scale of megaprojects is frustrating citizens and governments. Sure, the initial announcement of a megaproject was probably met with much fanfare and excitement. But now people are getting tired of waiting. Citizens want their problems solved faster and — more often than not — at a small-scale, local level.

Megaproject owners and developers are also losing their appetite for out-sized projects. The reality is that the risk/reward ratios rarely line up. There are too few developers able to take on the risk of these types of projects. There are too few professionals with the experience needed to make them successful. And, as we noted in Trend 3 (Risk perceptions and realities change), there are too few construction companies with the balance sheets required to develop the new design and construction approaches required to deliver them.

In response, we have started to see megaproject plans get unpacked. Rather than going for 'all-or-nothing' on Day 1, infrastructure owners and planners are starting to think about how they might deliver a series of smaller, more flexible and future-enabled projects that add incremental value to citizens' lives. Governments are also considering the merits of splitting their projects into smaller programs to allow for more nimble responses to changes in demand or technology, or simply to make them easier and more certain to deliver.

Look back: What did we predict?

In 2019, we predicted that "we may be rapidly approaching the effective limits of project size and complexity unless new approaches to project delivery are developed."

To be clear, this is not just an evolution of the age-old practice of packaging up projects into more manageable tenders. This is about taking an entirely new philosophical approach to infrastructure delivery that more closely mirrors the mantra of tech firms; move fast, make customers happy, and continuously update the technology to deliver ongoing value. Positive incrementalism needs to be brought to the fore.

Over the coming year, we expect to see infrastructure planners, promoters and owners putting more focus into creating a roadmap of smaller projects that provide greater long-term flexibility while delivering quick wins for citizens and consumers.

Trend 10:

The light bulb comes on

Data and Analytics has been increasingly part of the infrastructure conversation in Ireland for a number of years. However there is still a need for more joined up approaches and knowledge sharing in D&A. Authorities and government agencies are now gathering better quality data from new contracts with service providers and operators and skilling up to assess and analyse this information to inform better operations, asset management and project delivery. The question remains in many instances as to how best to use this information.

After years of bottom-up and disjointed data and analytics approaches, this is the year that many governments will begin in ernest to put the use of their data at the center of driving meaningful change in the way infrastructure is planned, designed, delivered, operated and maintained.

Many governments and asset owners have been making good progress on developing their D&A capabilities over the past year. In some markets, we have seen significant improvements in the way data is being used to support public consultation, needs prediction, operational efficiency and strategic planning. We have also seen governments thinking much more broadly about their data sources.

In Lisbon, Portugal, for example, the city authority is collecting, integrating and sharing mobility data from a range of public and commercial platforms to help customers make better informed choices about their options for moving efficiently across the city.

Yet, outside of a few innovative leaders, progress has been painstakingly slow; particularly when compared to other industries and sectors. This year, however, we expect to see forward-looking governments take bigger leaps to innovate.

In part, this will be driven by improved human capital capabilities. Front-line staff and management will increasingly develop the skills and secure the experience they need in order to make the most of their data. New tools (particularly machine learning applications) will take some of the analytics 'strain' off of employees' shoulders, thus allowing them to focus on more strategic activities. Execution skills will be developed and scaled up.

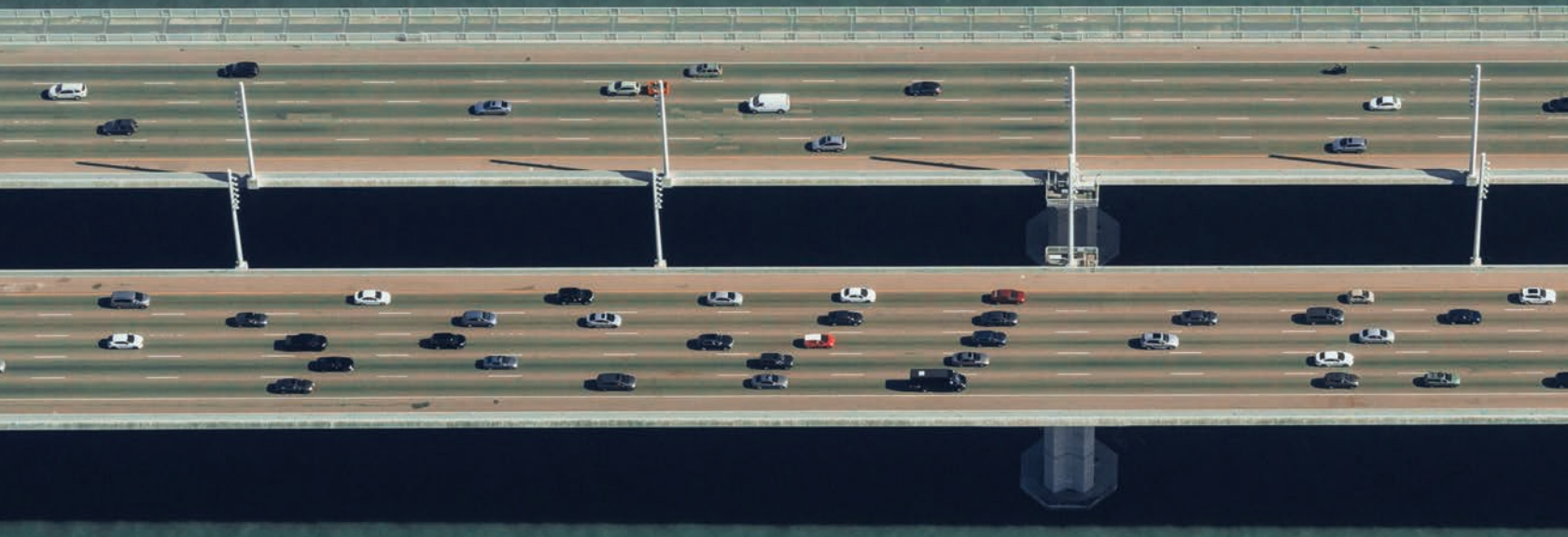
Look back: What did we predict?

In 2019, we predicted that "infrastructure authorities and planners [will] move towards more holistic and evidence-based decision-making processes. And that, in turn, will allow governments to take a much more informed approach to delivering on society's needs and expectations."

Greater access to richer sources of data should also drive significant progress this year. We expect to see many governments start to better define their legal and regulatory authority to collect non-operational data from their citizens. And we expect some to test the elasticity of their legal rights to collect and use customer data. Privacy concerns will rightly persist and, in a number of cases, grow.

As this trend progresses, expect governments to spend more time thinking about how they (and their technology vendors and data managers) secure, use and share data across the ecosystem. Also anticipate greater public debate about what exactly constitutes 'ethical use' of data in various jurisdictions (but don't expect a universal answer to that problem).

When combined with the increased need for public consultation (noted in Trend 1, Society finds its voice), the need for greater focus on asset lifecycle management (noted in Trend 2, Putting infrastructure resilience and safety first), the shifting expectations and needs of consumers (noted in Trend 6, Planners and consumers align) and the rebalancing of global competition (noted in Trend 8, Infratech tilts the balance), it seems the shift towards greater D&A capabilities and consumer value will continue to be a massive and enabling trend.



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To get in touch with us, contact:

infrastructure@kpmg.com

Contact us

Meet our KPMG Ireland Infrastructure & Government team

Michele Conolly
Head of Infrastructure & Government
KPMG in Ireland

T: +353 1 410 1546
E: michele.connolly@kpmg.ie
Michele Connolly

Robert Costello
Deal Advisory Director, Infrastructure & Government
KPMG in Ireland

T: +353 1 700 4428
E: robert.costello@kpmg.ie
Robert Costello

Cormac Deady
Consulting Partner, Infrastructure & Government
KPMG in Ireland

T: +353 1 700 4050
E: cormac.deady@kpmg.ie
Cormac Deady

Eamon Dillon
Audit Partner, Infrastructure & Government
KPMG in Ireland

T: +353 1 700 4237
E: eamon.dillon@kpmg.ie
Eamon Dillon

Alan Bromell
Tax Partner, Infrastructure & Government
KPMG in Ireland

T: +353 1 700 4177
E: alan.bromell@kpmg.ie
Alan Bromell

kpmg.ie

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