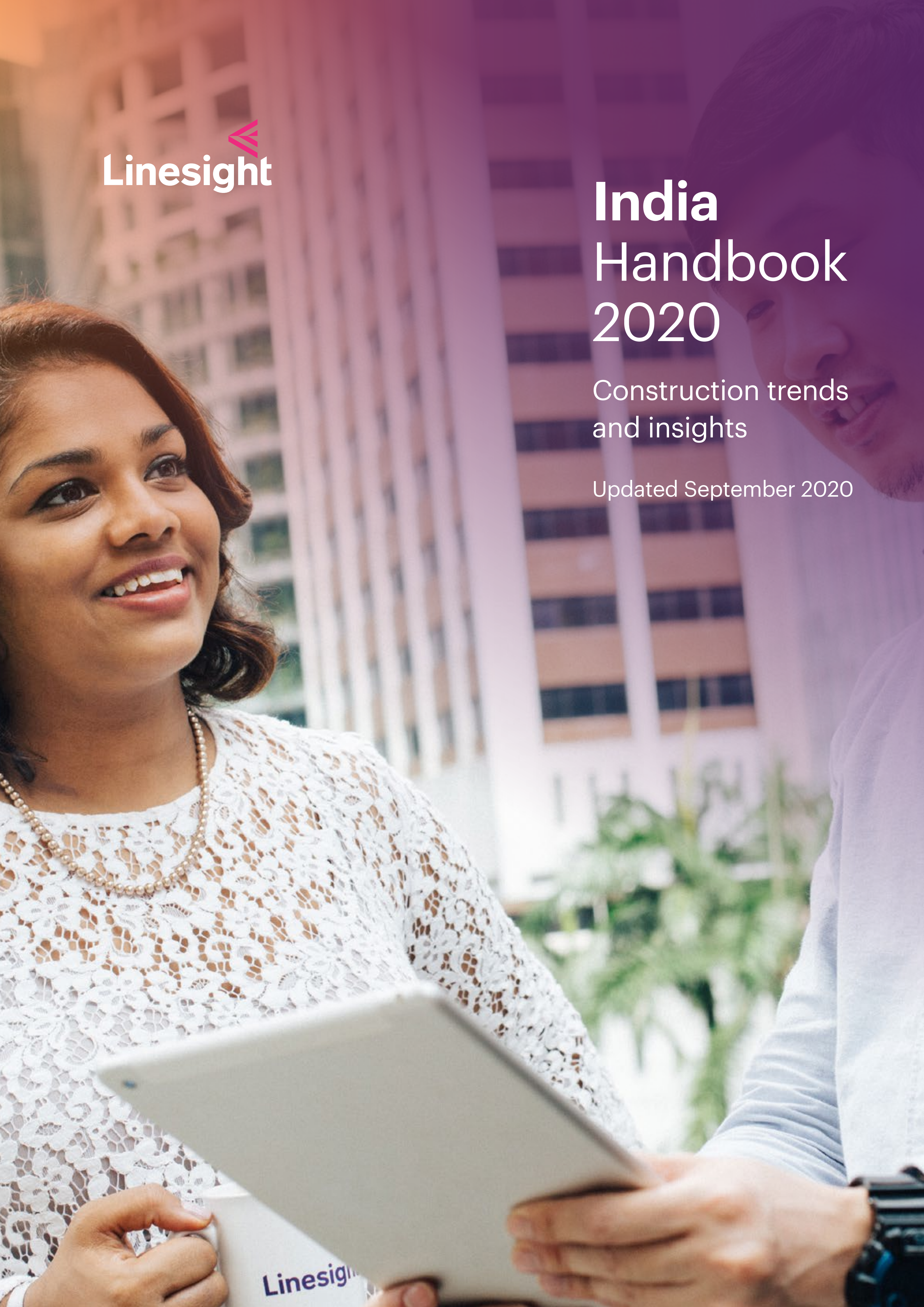

India Handbook 2020

Construction trends and insights

Updated September 2020

Mentor Graphics, Noida
Architect:
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Cost Management

Welcome to the **Linesight India Handbook 2020**

Each year, we gather all the key indices and trends in India construction, giving you the most comprehensive overview of the industry.

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India market review

Due to the COVID-19 pandemic, India is facing considerable economic challenges. Darshan Joshi, Country Director – India at Linesight, reviews the economic and construction industry performance to date, as well as the outlook for the near future.

Economic overview

Back in June, the International Monetary Fund (IMF) projected a sharp contraction of 4.5% for the Indian economy in 2020, a "historic low," but noted that the country is expected to bounce back in 2021 with a robust 6% growth rate. The Q2 2020 figures showed that it had been India's worst quarter ever recorded, with a 23.9% contraction – a far starker figure than had been predicted, following the 3.1% growth seen in Q1. However, despite previously being one of the fastest-growing large economies, the Indian economy had already seen a deceleration in GDP prior to the virus outbreak, for four consecutive years.

This decline has been the most severe amongst the world's top economies, with consumer spending, private investment and exports all plummeting, which is perhaps not all that surprising with the strict lockdown that had been imposed. The combination of the severe lockdown and the proliferation of the virus following the tentative lifting of some restrictions has dealt a double blow to the economy. As a manufacturing powerhouse, the contraction of the sector in India by 39% is hugely significant.

However, parts of the economy are beginning to show signs of recovery, and with the Ministry of Home Affairs now announcing that the 28 states across India shall not impose any localised lockdowns outside of containment zones without consultation with the central government, there is further hope that this will help to kickstart the economy.

In 2019, India was a US$2.7 trillion economy and pre-COVID, its aim by 2024 was to be a US$5 trillion economy. However, the general consensus amongst economists is that the Indian economy may be 10% smaller by next year.

With an already strong e-commerce market – the fourth largest in the world at US$850 billion, the pandemic has further bolstered the segment, which is now expected to reach a Gross Merchandise Value (GMV) of US$100 – US$200 billion by 2025. Warehousing is expected to also be strengthened in the coming years, from an estimated US$12.2 billion in 2020 to US$19.5 billion by 2025. While COVID is expected to have a negative impact in the short-term, by way of reduced demand due to lockdown and reduced manufacturing, as referenced above, it is supporting the aforementioned e-commerce trend, which will strengthen the demand for warehousing in the more medium term.

FDI equity inflows of US$49.97 billion have been seen during 2019-20, more than 70% of which have come from Singapore, Mauritius, the Netherlands, USA and Japan.

Labour market

India possesses a large labour pool, as almost half its population of 1.2 billion is of working age. With the COVID crisis, unemployment has jumped, reaching 9.1% in mid-August, up from 8.67% the week previous. Following a huge uplift in unemployment figures in April and May to over 23%, there had been significant improvements, falling to 7.4% in July.

Construction

The lockdown and the complete closure of business for more than four months stimulated a drop in demand, disruption in the supply chain and migration of labour. Unlock 3.0 saw more business reopen, and with Unlock 4.0 addressing interstate movement of people and goods, as well as the lifting of some social, academic, sporting, entertainment and cultural restrictions as of 7th September, is India continuing its journey to recovery. Construction has been one of the sectors worst hit, with a 50% decline in construction output recorded in Q2. In an effort to revive the industry, the housing and urban affairs ministry is urging all states to follow Maharashtra's lead and reduce the stamp duty.

Looking at one of India's most robust sectors, data centres, throughout the lockdown, as more and more industries and people became reliant on digital infrastructure, a 14% increase was seen in data consumption. As of June 2020, India's sector capacity stood at 375MW, following the addition of 27MW since the beginning of the year and the expectation is that the capacity will increase to over 1,000MW by 2025. This will be driven by more data localisation, the shift from owner-occupied towards colocation, and the proliferation of new technologies, such as artificial intelligence and edge computing. This creates significant opportunities within the construction industry, both in terms of the of the facilities themselves and the development of the supporting infrastructure required.

As a powerhouse in the manufacturing of pharmaceuticals for the global market, India's sector is fundamentally important to its economy. Unlike other industries, the life sciences industry has remained a priority during the pandemic, in terms of continuing to provide lifesaving medicines and advancing therapies to treat infected patients, and so construction of suitable facilities has remained a priority. Furthermore, in producing over half of the world's vaccine supply, it is likely to play an important role in the manufacturing of a COVID-19 vaccine. However, it is also pushing itself to the forefront in the development of such a vaccine, with Prime Minister Narendra Modi referencing three COVID vaccine contenders in his Independence Day speech. With these factors in mind, the life sciences sector is expected to continue to be relatively robust.

Other sectors, however, have not remained as unscathed as those mentioned above. The residential market is anticipated to be one of the worst affected by the pandemic, although this is expected to be somewhat confined to the higher end of the market, with affordable housing supported by both public and private spending. As is the case globally, commercial is also expected to be heavily impacted through reduced demand for office space, as organisations re-evaluate their workplace requirements given the current work-from-home situation. In late August, the Times of India reported that over 6 million sq.ft. of commercial office space had been given up in the first six months of the year.

Q2 was India's worst quarter ever recorded, with a 23.9% contraction, following 3.1% growth in Q1.

Summary

Between the strict lockdown and the rapid spread of the virus, India has been dealt a double blow by COVID, and its economy is seeing the effects of that. Recording one of the most severe declines amongst the world's top economies, the country recorded its worst ever quarterly performance on record, with a 23.9% contraction in Q2. Construction has been particularly hard hit, and efforts are underway to revive the industry, although data centre demand is expected to continue on a strong trajectory, offering some reason for hope.
Furthermore, a number of multinational organisations in the technology, electronics and automobile industries have recently announced their intention to invest in India post-COVID, with the relaxation of government policies on the necessary permissions and FDI incentives to promote "Atmanirbhar Bharat Mission" favourable in attracting this investment.

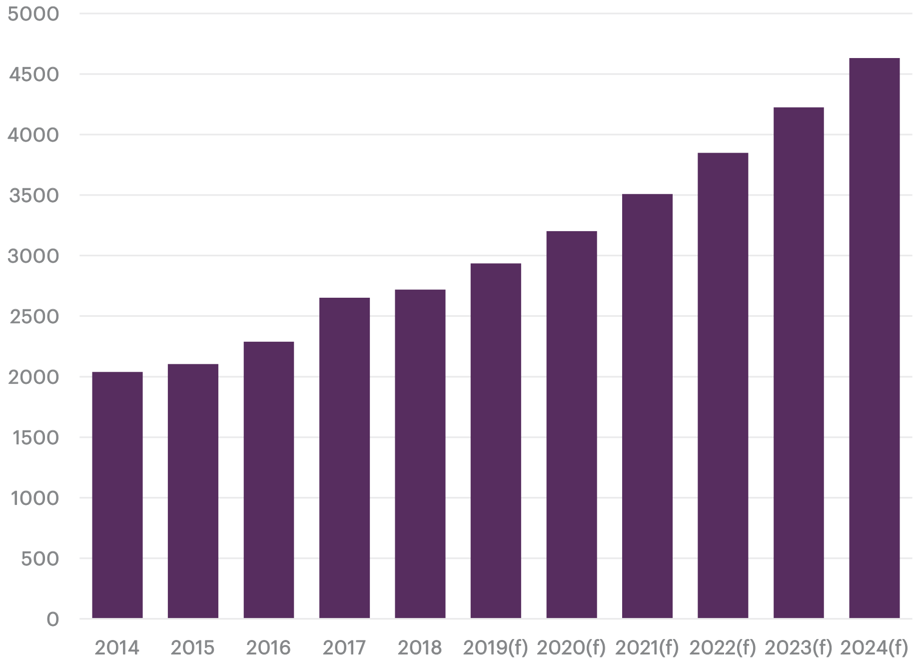
“Working with a multinational business with such a strong global presence is really important to me. I’m benefitting from the knowledge transfer and expertise from other regions, as well as my colleagues here in India, as part of an ambitious, dynamic and energetic organisation.”

Vivek Saundore,
Senior Cost Manager

Throughout the following sections, the * symbol denotes graphs/data last updated in March, and so the impact of COVID-19 is not accounted for in the marked items.

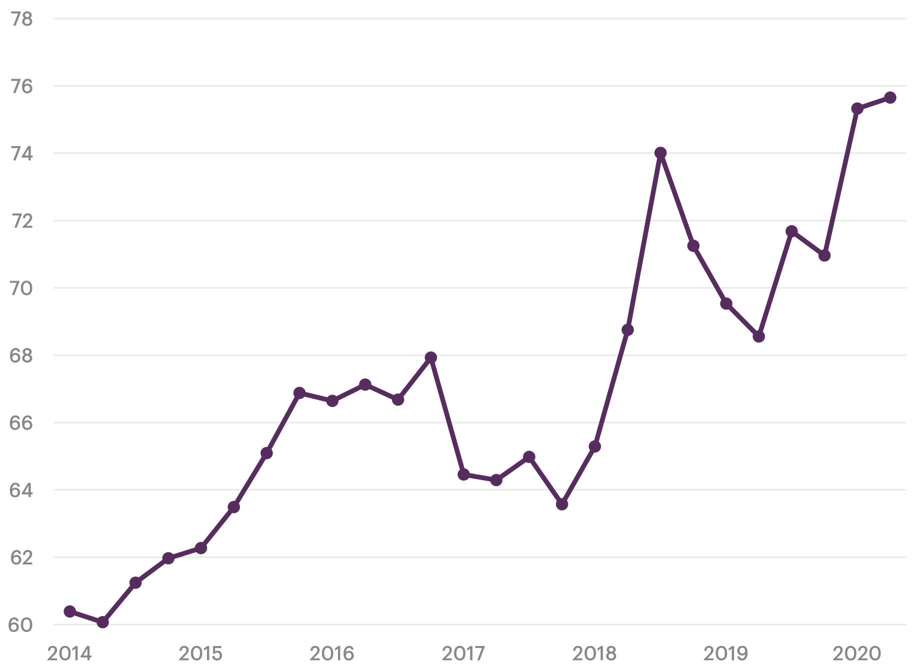
1. Macro indicators

1.1. India GDP 2014 - 2024(f)



Source: *IMF*

1.2. US Dollar vs Indian Rupee



Source: *European Central Bank*

2. Linesight average Indian construction costs 2020

		Cost range 2020	
Residential		from	to
Apartments, high rise, average standard	Apartment units with fit-out, including air-conditioning, kitchen cabinets and home appliances, but **excluding** decorative light fittings and loose furniture	519	662
Apartments, high rise, high end	Apartment units with good quality fit-out, including air-conditioning, kitchen cabinets and home appliances, but **excluding** decorative light fittings and loose furniture	872	1,051
Terraced houses, average standard	Houses with fit-out, including air-conditioning, kitchen cabinets and home appliances, but **excluding** decorative light fittings, loose furniture, garden and parking	399	420
Detached houses, high end	Houses with good quality fit-out, including air-conditioning, kitchen cabinets and home appliances, but **excluding** decorative light fittings, loose furniture, garden and parking	525	552
Commercial / Retail			
Medium/high rise offices, average standard	RC structure, curtain wall, including public area fit-out (flooring, ceiling & wall finishes, etc.) and associated M&E works, **excluding** tenant area fitout & M&E services	436	473
High rise offices, prestige quality		546	578
Out-of-town shopping centre, average standard	Including public area fit-out and M&E, but ***excluding*** shop fit-out	425	462
Retail malls, high end		594	641
Industrial			
Industrial units, shell only (Conventional single storey framed units)	RC structure with steel roof and M&E to main distribution, but **excluding** a/c, heating and lighting	341	399
Owner operated factories, low rise, light weight industry	RC structure, including small office with simple fit-out and M&E, but **excluding** a/c and heating	362	425
Hotels			
Budget hotels - 3-star, mid market	1) Interior decoration 2) Furniture (fixed and movable) 3) Special light fittings (chandeliers, etc.) 4) Operating Supplies and Equipment (OS&E) **excluded**.	819	909
Business hotels - 4/5-star		1,276	1,513
Business hotels - 5-star		1,613	1,765
Others			
Underground/basement car parks (<3 levels)	RC structure	289	310
Multi storey car parks, above ground (<4 levels)	RC structure, natural ventilation, no facade enclosure	221	242
Schools (primary and secondary)	Including fit-out and a/c, but **excluding** educational equipment	273	310
Students' residences	Including fit-out, loose furniture and a/c	310	341
Sports clubs, multi purpose sports/leisure centres (dry sports)	Dry sports (no swimming pool) and are for 'leisure centre' type schemes including main sports hall, ancillary sports facilities, changing and showers, restaurant / cafe, bar, etc. Costs include a/c, Furniture, Fittings and Equipment (FF&E).	604	630
General hospitals - public sector	Excluding medical and operating equipment	662	725
	Exchange Rate Used : US$1 =	**INR 75**	

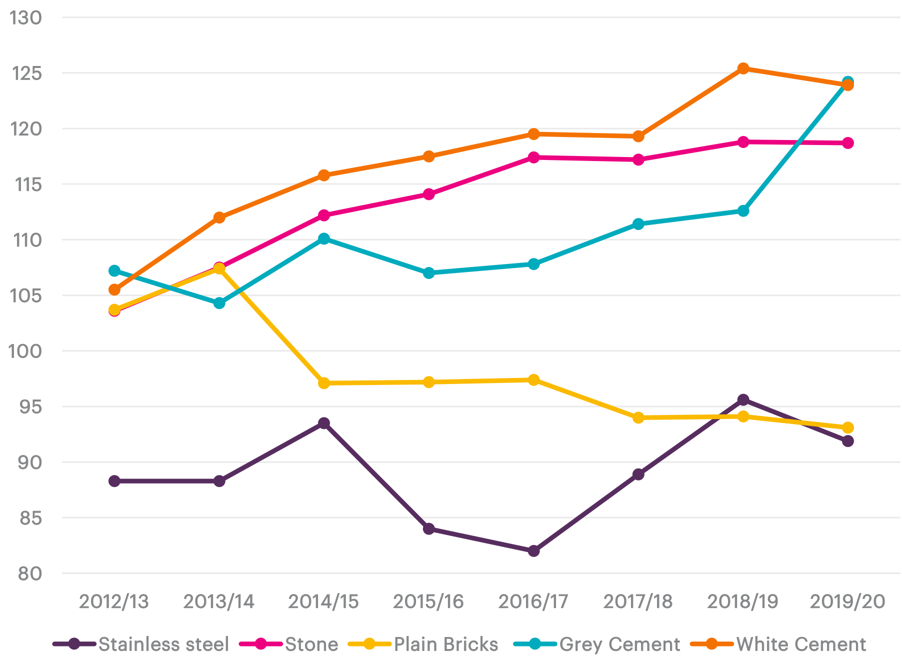
Notes:

1. *The above costs are correct as of the end of August 2020, but given the rapidly-changing landscape that COVID presents, it should be noted that this is a snapshot in time and these costs may have changed in the interim.*
2. *The costs for the respective categories given above are averages based on fixed price competitive tenders. It must be understood that the actual cost of a building will depend upon the design and many other factors and may vary from the figures shown.*
3. *The costs per square metre are based on Construction Floor Areas (CFA) measured to the outside face of the external walls / external perimeter including lift shafts, stairwells, balconies, plant rooms, water tanks and the like.*
4. *All buildings are assumed to have no basements (except otherwise stated) and are built on flat ground, with normal soil and site condition. The cost excludes site formation works, external works, land cost, professional fees, finance and legal expenses. The cost excludes any cost against Covid 19 pendamic for productivity loss or impact on supply chain system.*
5. *The standard for each category of building varies from region to region and do not necessary follow that of each other.*
6. *All costs are in US$/m2 CFA. Fluctuation in exchange rates may lead to changes in construction costs expressed in U.S. dollars.*
   Rates are based on projects in Mumbai.
7. *Average costs as indicated should not be used for insurance valuation purposes. The costs are representative of typical specifications for each type of project. Unique designs or challenging sites may not be within the cost range shown. The rates shown are average construction build only costs and do not include GST, professional fees or allow for future inflation.*

Source: *Linesight*

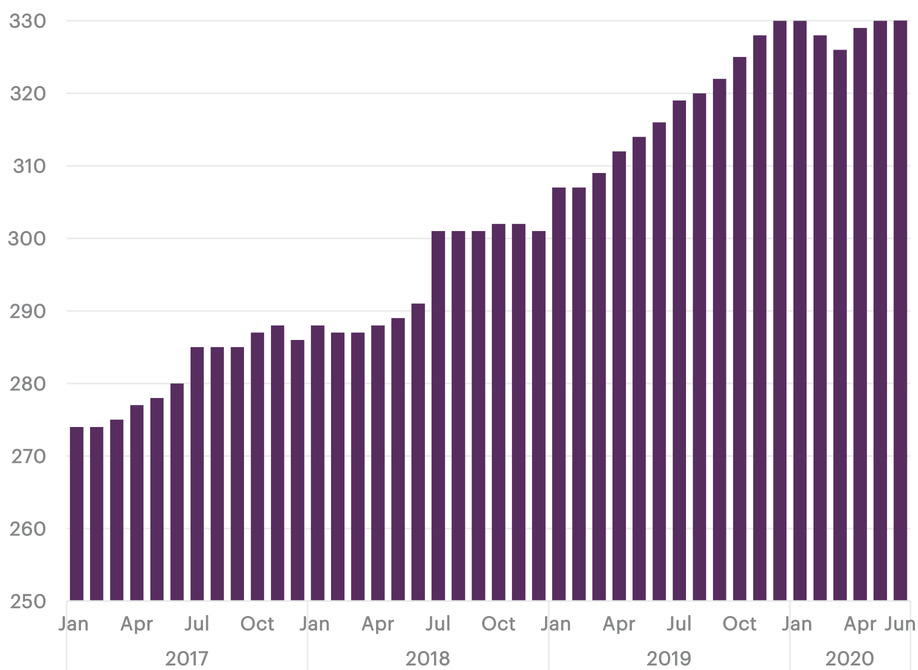
3. Indices

3.1. Wholesale price index - building materials



Source: *Office of the Economic Advisor, India*

3.2 Consumer price index



Source: *Labour Bureau, India*

"I really enjoy the supportive and collaborative culture here at Linesight. I have the opportunity to work across an array of sectors as part of a multinational construction consultancy business, learning from the international experience of my colleagues across the globe."

Niranjan Ghule,
Senior Cost Manager

Review and Outlook

Global Insights

Global Market Review

In just a matter of months, the global landscape has changed dramatically, with COVID-19 having a profound impact on economies around the world.

In our early March Knowledge Centre update, we referred to COVID-19 as a new threat to the global economy, following eighteen months of uncertainty arising from the US-China trade war, which appeared to be coming to an end with the signing of the Phase 1 deal in early 2020. In a matter of mere weeks, the novel coronavirus moved from an impending threat to a confronting reality, and has had an unprecedented impact on both public health and the economy.

Recovery and resurgence in APAC

As the region in which the COVID-19 outbreak originated, many parts of Asia are a number of weeks ahead of the rest of the world in terms of recovery. Indeed, as other parts of the world seek to curb the spread of the novel virus, they can look to countries such as China, to review the efficacy of various policy responses in efforts to soften the economic shock.

The pandemic initially caused shutdowns in Asia earlier than elsewhere in the world, with industry grinding to a halt in February and having a significant impact on global supply chains. COVID-19 then brought much of the world's economic activity to an abrupt standstill, serving a secondary blow to the export-reliant Asian economy.

Asia's purchasing managers' indices (PMI) in August show up some mixed results – with Indonesia and Taiwan above the 50 mark, and the latter recording its highest figure in two years at 52.2, and Japan, South Korea, Malaysia, the Philippines and Vietnam all sub-50, indicating contraction. However, some of these sub-50 figures are still indicating gradual improvement and recovery, particularly in the big manufacturing nations. Bloomberg Economics also reported that a private gauge of China's factory activity grew at the fastest pace in August since January 2011, helped by improving exports and continued domestic recovery.

Having seen economic growth of 6.1% in 2019, despite the trade war, the Chinese economy was heavily impacted in Q1 with a 6.8% decline before a return to positive growth of 3.2% in Q2. Although the Phase 1 agreement seemed hopeful with regards to the US-China trade war, tensions have once again intensified, which is having an impact on the Chinese economy and remains a risk factor.

In India, pre-COVID, some important reforms, while expected to benefit the economy in the longer term, such as a unified tax system and demonetisation, have been disruptive in the short term, and India has since been faced with considerable economic challenges due to the pandemic. Q2 was India's worst quarter ever recorded, with a 23.9% contraction and the IMF is projecting a 'historic low' for 2020, with a 4.5% contraction, before a return to growth is expected in 2021.

Although Australia appeared to have a good handle on containing the virus by June, and was beginning to focus on awakening its economy, there has been a recent resurgence in the virus and a recession has hit the nation for the first time in 28 years. A contraction of 6% is expected for 2020 before a prolonged recovery period kicks in over the coming couple of years. The Government introduced a considerable stimulus package, including the AU$130 billion JobKeeper payment, which aimed to keep Australians in work and support businesses that had been significantly affected by the economic impact of the virus.

Singapore had an austere reaction to the pandemic, implementing an eight-week circuit breaker to suppress the virus. It entered a recession in Q2 with a 41.2% contraction quarter-on-quarter. To date, the government has announced four support packages worth close to S$100 billion (nearly 20% of GDP), and has not ruled out announcing another package.

Plummeting activity in Europe

Europe has been particularly hard-hit by the pandemic, between the public health impacts and the strict lockdowns seeing economic activity plummet, and the eurozone recorded an economic contraction of 11.9% in Q2.

Although the European Central Bank acted quickly upon the onset of the virus, with significant stimuli put in place to prop up the regional economy, it now appears that even more stimuli will be required from the ECB to tackle the disinflationary impact. Inflation in the eurozone was negative in August for the first time in over four years, with a figure of -0.2% recorded across the 19 countries, well below the ECB's target of 2%. While it is hoped that this is relatively temporary and that a rebound is in the near future, Brexit remains a significant risk, in addition to the pandemic.

Although many European countries looked to be making a recovery in July, as lockdown and restrictions were lifted, a marked slowdown was seen in August as COVID cases rose again in some countries, with the eurozone PMI dropping from 54.9 to 51.6. Unemployment hit 7.9% in July, up from 7.7% in June, although a Reuters survey of economists had projected a slightly higher figure of 8%.

As Europe's largest economy, Germany, which was already enduring a period of political instability and ongoing economic uncertainty, has reported Q2 as its worst quarterly performance on record, with total output falling by 10.1%. Despite Germany not being as reliant on tourism as other European countries and the public health effects not being as stark, consumer spending has nosedived, and this has been coupled with the steep decline of exports and global trade, which are significant contributors to its economy. While its economy is doing better than initially expected, the aforementioned sluggish demand may prolong the recovery period. Germany's political landscape is in a state of flux, as far-right and the green parties gain popularity, and the once-powerful democratic left has become alienated from the industrial, working-class base.

Meanwhile the French economy, Europe's second largest, saw GDP decline by 13.8% in Q2, although there was moderate improvement in May and June as lockdown measures eased. It was reported that economic activity was down 7% year-on-year in July, albeit an improvement on previous months, as construction activity ramped back up. Spain, however, has recorded its worst recession of modern times, with the economic shock leading to declines of 5.2% in Q1 worsening to 18.5% in Q2, coming out as the eurozone's worst performer.

The Irish economy is expected to shrink by 8.5% this year, and the Government's budget deficit increased to €9.5 billion in August, as VAT receipts reduced and spending on the likes of income supports related to the pandemic soared, compared to a deficit of €625 million this time last year, marking a year-on-year

The IMF is projecting a 'historic low' for India in 2020, with a 4.5% contraction, before a return to growth is expected in 2021.

deterioration of €8.8 billion. In addition to contending with COVID-19, Ireland stands to be one of the most impacted countries in the eurozone at the hands of Brexit, with the lack of direction adding to the uncertainty. Furthermore, as a country that is heavily reliant on FDI, the performance of the US economy is particularly impactful.

As the end of the Brexit transition period fast approaches, and the economic shock of COVID continues to be felt, the UK has entered a recession for the first time since 2009, with a decline of 2.2% in Q1 followed by a negative figure of 20.4% in Q2 – the steepest decline on record. The Government has put in place various packages and supports to mitigate the negative impacts and start on the road to recovery, but it is fair to say that economic recovery will be heavily dependent on any recurrence of the virus and whether post-Brexit trade deals are secured.

Israel has posted its worst performance in more than 40 years in Q2, coupled with the CBS (Central Bureau of Statistics) reporting a 28.7% decline. This follows a 10.1% contraction in Q1, after 3.4% growth in the second half of 2019. The country's high-tech landscape has been largely unscathed in comparison to other sectors of the economy. The ripple effect from the pandemic has not been felt so far in the sector, but a slowdown is expected as the pandemic continues.

Record contraction for the US

The US started the year with strong optimism, but reported its sharpest contraction on record (since 1947) in Q2, at a rate of 32.9%. While it was hoped that recovery would ensue quickly, the second wave of the virus in some locations and resulting measures to suppress it infer that it may take longer than initially anticipated.

As the main driver of the US economy, consumer spending is a particularly important indicator, and declined by 10.7% year-on-year in Q2. Unemployment stood at 10.2% in July, down from 11.1% in June. In addition to the pandemic, rising tensions again between the US and China also pose a significant risk to its recovery.

Looking forward, unsurprisingly, projections for 2020 have been curtailed significantly, with GDP now expected to contract by 6.5%. Key commodities and materials have already seen a drop in prices, with oil and steel products bearing the brunt of this decline. Production facilities are slowing down, and in some cases, closing completely, which raises concerns over the ability to increase supply once demand returns.

Continued volatility in the GCC

In addition to COVID, oil prices, geopolitical tensions, global trade wars and macroeconomic performance continue to have a significant impact on growth and make the GCC less predictable than most major global markets. A contraction of 7.3% is expected in the Middle East oil-exporting countries as of July 2020. In addition to the effects of COVID, the GCC remains highly dependent on the oil economy, and the market volatility will undoubtedly have a role to play in terms of the pace of recovery post-pandemic.

The UAE Central Bank has forecast economic contraction of 3.6% for 2020, having put together a comprehensive stimulus package to support the economy, with increased loan-to-value ratios for first-time home buyers, as well as the range of regulatory changes announced in 2019.

The pandemic is dealing a double blow to Saudi Arabia, with a high volume of COVID cases, as well as energy market turmoil, including cuts in production and an oil price decline to below US$20 per barrel, saddling the Government with a budget deficit that could rise to around 15% of GDP this year. Officials have been reported to have doubled their borrowing plans and implemented a series of austerity measures, including raising the VAT rate from 5% to 15%.

KIm Hegarty
Director

GLOBAL INSIGHT

The evolution of data centres

By 2025, the International Data Corporation (IDC) projects that the global need for data will skyrocket to 163 zettabytes, and COVID-19 has further increased our reliance in the interim. But how is this dependency on data in our day-to-day lives affecting the data centre sector?

Gavin Flynn,
Program Director

Eoin Byrne,
Associate Director

Today's world is dependent on data, and that dependency has been exacerbated by the COVID-19 pandemic. By 2025, the International Data Corporation (IDC) projects that the global need for data will skyrocket to 163 zettabytes. From our banking infrastructure to our smart homes, technology and information play an increasingly crucial role in every aspect of our daily lives. This demand will continue to propel the data centre market, which has changed dramatically since the 1940s, when large computer rooms like the Electronic Numerical Integrator and Computer (ENIAC) became the predecessors of modern data centres. From 2019 to 2023, the global data centre market size is expected to grow by US$284 billion, at a compound annual growth rate (CAGR) of more than 17%. But with the accelerated pace of innovation calling for facilities that are built faster, on tighter budgets and to evolving specifications, the construction industry must first understand the new challenges impacting the market. By bringing improved construction management methods like cost management, procurement and supply chain management, the industry can address the new challenges related to cost and time to market.

The impact of cloud and edge computing

The adoption of cloud infrastructure has heavily influenced the requirements of modern data centres. With the advent of cloud-based software platforms, the organisation of resources has shifted to hybrid cloud systems, which pools off-premises and on-premises resources to optimise digital processes.

Another shift in workflows that affects the market is the rise of edge computing. More Internet of Things (IoT) devices, and the increased need for real-time data analytics and interactions, have pushed the demand for applications to have their computing processes closer to end users, which is usually at the edge of a network. By 2025, it is projected that 75% of enterprise-generated data will originate and be processed outside of traditional data centres or clouds.

This restructuring of digital resources has caused many enterprises to begin shifting from owning or operating their own data centres to incorporating colocation and managed hosting services. Businesses are now spending more on cloud infrastructure services than on data centre hardware and software: from 2009 to 2019, spending on cloud infrastructure services has grown by 56% annually to nearly US$100 billion, while annual enterprise spending on data centre hardware and software grew by only 4% on average.

Hyperscale and colocation

This substantial change in how digital resources and infrastructures are managed has boosted the hyperscale market, but also shortened project timelines. More than half of data centre hardware and software spending now comes from cloud providers' hyperscale facilities. This massive demand for more capacity means that previously acceptable project durations are no longer sustainable. Providers must explore other options to reduce their construction schedules, which can include changing designs, land banking, developing cold shells and applying pressure to the construction market to match the speed of data centre growth. The added demand has a domino effect. If hyperscale facilities and their supply chains cannot meet the need for more capacity, enterprises can lease more space from colocation providers to handle changing workload requirements.

Modular construction

Another way in which data centre demands can be met is by adopting a modular construction approach. By applying modular techniques, speed to market can be addressed with an efficient supply chain. Modules can be manufactured offsite and tested for compliance, while the shell and core are built on location. Once the modules are ready, they can be shipped to the site and installed quickly. The simultaneous progress of all elements of the build shortens schedules significantly, with a 25-30% reduction in the time needed to build and commission a modular project.

There is also the added benefit of cost efficiency when adopting a modular approach. This is achieved by standardising certain building materials and designs. The modular method also employs economies of scale, where building materials that are mass-produced can be made at a lower cost.

Supply chain and procurement management

While modular construction methods may help in preventing delays and cost overruns, supply chain and procurement management processes are also extremely important tools that can be used to drive down costs and control project schedules. With market growth comes stress on the pool of available equipment manufacturers and suppliers, and if there are delays to equipment deliveries, then there will be interruptions in the overall project schedule. Equipment is a critical part of the project and can have a direct impact on a provider's ability to complete builds on time. By having an established supply chain with robust contracts, providers can take proactive steps to protect themselves.

Vendor Managed Inventory (VMI) is another key element. With the market moving towards more cost effective and consistent oversight of large equipment, VMI provides suppliers or the supply chain with more certainty around the construction project pipeline. This in turn helps them to be more economical and flexible to align with their customers' demands. VMI also enables owners and data centre providers to reduce their overall lead time. Collaboration and information sharing between clients and suppliers are essential to drive these results. By implementing supply chain and procurement management processes, and working closely with suppliers, project costs can be reduced and delays can be minimised.

The next step in data centre construction

The changing requirements of data centre builds and the growing demand for capacity highlights the need for a solution that can bring projects to market quickly and within a reasonable budget. Providers must now look beyond traditional construction techniques to meet market demands by employing a developed approach to procurement and supply chain management in navigating the new age of data centre construction.

GLOBAL INSIGHT

The impact of COVID on the supply chain

The supply chain has been one of the key casualties of the pandemic, with significant disruptions to delivery schedules and material supply remaining a core challenge.

Neil L Doyle,
Director

From the very early stages of the COVID-19 pandemic, with its outbreak in China and its proliferation around the world, and the subsequent and ongoing lockdown periods, the impact on the supply chain has been one of the key considerations and vulnerabilities for the construction industry. Significant disruptions to delivery schedules and material supply remain a key challenge, with diversification and strength within the supply chain now a fundamental objective. With the risk of financial instability, the strain on resources, and reduced efficiencies, lower working capacities and increased sanitation checks leading to longer lead times to contend with, there are three core pillars to focus on with regards to securing the supply chain, as discussed below; investment, diversity and resilience.

Investment

Construction is an essential component in the recovery of the global economy, constituting a key contributor to GDP for most countries and a vital source of demand for raw materials. As the industry continues to recover and restart, investment in the supply chain is a fundamental requirement across all levels.

Private investment and financial support from clients and Tier 1 suppliers should be provided to the lower levels of the supply chain to protect and secure it, and avoid further casualties of COVID-19. These lower levels are key to a successful recovery of the construction industry, and with numerous suppliers affected by the pandemic, the focus should be to return to pre-COVID levels. Equity investments and acquisitions are crucial to the re-emergence of the supply chain. It is also imperative that government stimulus packages are used to restart the economy and provide a boost to the lower levels of the supply chain to return to operations. The current shortage of materials will continue in effect if government support is not provided.

Lastly, with the delays caused by COVID-19, the sharing of business forecasting and planning is imperative to securing a supply chain. Many businesses are now employing the use of advanced purchasing and increasing inventory levels to provide short-term security in the supply chain. While this will provide encouragement to the suppliers, the onus must be on the supplier to maintain pricing levels and not pass the costs of inventory storage to the consumer.

Diversity

With the considerable disruptions to the supply chain, which are well documented at this stage, there has been an increased focus on sourcing more local suppliers, who have manufacturing capacity and materials available to circumvent the overseas shipping delays. This includes Tier 1 suppliers looking into local suppliers, with an overall shift away from dependency on cheaper produce available from other regions. If COVID has highlighted anything to the wider industry, it has been the overreliance on China as the factory of the world, and there is now a marked effort to look at other low labour cost locations as alternatives.

The pandemic has undoubtedly spurred on key improvements across the industry and the supply chain, including innovation to maintain agility in the sources of supply and to mitigate the risk of issues in the supply chain. The ability to move quickly to activate secondary supplier relationships, and secure additional critical inventory and capacity is key. It may also be prudent to identify suppliers with shared resource pools for raw materials inventory, where it applies. Overall, the adaptability of suppliers is coming to the fore.

Furthermore, COVID-19 has impelled the digitalisation of supply chain management, innovation and the advancement of technology. This extends across resource planning, supporting increased communication without the need for complex travel arrangements and enhanced supplier relations.

The severe impact we have all witnessed within supply chains around the world has led to a rethink around different supplier resources, and mapping those out to reduce the impact in the supply chain when 2nd and 3rd tier suppliers can't meet demand. While it can be expensive as it requires time to build up a good

risk-mitigation strategy and an updated list of companies in the market, it is ultimately worth it to avoid disruption at times like this. Lastly, the importance of better due diligence checks and increased awareness across the supply chain cannot be underestimated. It is imperative to know all of the supplier base below level 1, and where the supply comes from to secure business continuity. There is also, of course, a need to now tighten up supplier selection protocols. updated list of companies in the market, it is ultimately worth it to avoid disruption at times like this.

Lastly, the importance of better due diligence checks and increased awareness across the supply chain cannot be underestimated. It is imperative to know all of the supplier base below level 1, and where the supply comes from (geographical location) to secure business continuity. There is also, of course, a need to now tighten up supplier selection protocols.

Resilience

Needless to say, resilience within the supply chain has become all the more important in light of the current pandemic. The impact of COVID is reverberating down the chain, through Tier 2, 3 and 4, given the unavailability of raw materials and components to feed up through. With the reduced efficiencies and loss of revenue as a result of less purchasing during the pandemic, financial instability within the supply chain is a risk, and the increased strain on resources may drive some suppliers out of business.

Conversely, some businesses and supply chains have demonstrated their adaptability and changed their approach, and may have excelled during the pandemic due to demand, e.g. PPE, delivery services. We have seen collaboration across the supply chain in some instances, with suppliers working together with a common end goal in sight. Some have even seized opportunities presented by the crisis for growth, with new businesses emerging, although the long-term stability and viability of these companies could be considered somewhat precarious.

Ultimately, companies are quite susceptible to experience disruption in the challenging times we find ourselves in, with potential factory closures at play, whereby manufacturing can grind to a halt very quickly. Supply lead times are being prolonged by the extra security and sanitation checks required, with packaging, loading and shipping taking longer than previously, and scheduling becoming more difficult.

Summary

Undoubtedly, the impact of COVID-19 on the supply chain has been a huge issue since the early stages of the outbreak and has been felt around the world. It has proved to be a significant challenge and vulnerability for the construction industry, and the need to protect and secure the supply chain has never been more apparent. There are three core pillars that we view to be fundamental in this regard, as discussed above – investment, diversity and resilience.

GLOBAL INSIGHT

Reimagining the post-pandemic workplace

COVID-19 is redefining how we live and work, as well as altering our perceptions of place, and challenging us to rethink the design and functionality of our spaces.

Adrian Farren,
Associate Director

Des O'Broin,
Director

COVID-19 is redefining how we live and work, as well as altering our perceptions of place, and challenging us to rethink the design and functionality of our spaces. The built environment will face new demands post-pandemic, and how we use spaces will change, from repositioning and adapting existing assets to building new ones.

Real estate has undergone quite a bit of change in recent years as is, with the proliferation of concepts such as coworking, flexible working and hot desking, providing new solutions that account for the evolving ways in which we work. However, COVID has certainly served as a catalyst for transformation with the commercial and corporate interiors space. In this piece, we put forward some of the key considerations in this sector for the near future, as we look towards a return to offices.

The role of remote working

Prior to the pandemic, the proportion of individuals working remotely was low, with figures from various labour force surveys indicating that just 5% of the workforce in the EU27 worked from home in 2019 – a proportion that had remained relatively constant since 2009. In the US, this figure was 7% according to the 2019 National Compensation Survey from the Bureau of Labor Statistics. Despite years of predictions about remote working being the upcoming trend and advocacy for its merits, a marked shift never really happened. And yet, suddenly in March 2020, working from home was thrust upon us as the new norm.

While productivity has been relatively unscathed – a recent Stanford report notes a 13% gain in employee performance related to remote working – it is clear that social and collaborative workplace engagement have been casualties of full-time working from home, and that employees may not feel as connected to the company culture as they do when immersed in it physically in an office. It is more challenging to maintain the more personable, human aspect of an organisation remotely.

Going forward, it is likely that there will be a happy medium in terms of remote working, and that corporate workspaces will serve as environments for collaborative working and connectivity, rather than a place where employees come to work on individual projects or tasks.

Density and space utilisation

Pre-COVID, soaring real estate costs were driving higher density and greater utilisation of space. Many large companies were forming global standards of office spaces, that were essentially a kit of parts to be adapted to different locations, such as tech hubs, easily configured offices, open-bench workstation neighbourhoods, and open network team areas. In terms of average square feet per employee, the norm in the 1980s was 200 to 300, according to Moody's Analytics, but by 2019, that average had fallen to 126.5.

However, with the social distancing measures in place for the foreseeable future, and the abovementioned role of remote working going forward, space capacity and functionality will change, meaning that traditional high-density configurations of rows of desks will have to be reconsidered. With offices expected to cater more towards collaborative and social functions, there will need to be a shift towards smarter spaces that are conducive to interaction and conversation.

HVAC

The role of adequate ventilation and indoor air quality in office spaces is obviously important, but it should be noted that not all heating, ventilation and air conditioning (HVAC) systems are up to the task for current requirements. Now more than ever, it is vital that systems are reviewed with fresh air intake in mind and relative humidity, and potential improvements, such as filter upgrades, pre-filtration options and purification solutions, considered. The opportunity for smart technology to optimise the systems should also be explored, in terms of monitoring CO2 levels as a fundamental air quality indicator (and of the performance of the ventilation system), and controlling the operation of the system.

A strong focus on well-being

In recent years, there has been increased focus on the role of health and well-being in the workplace. Given that the average American spends 93% of their life indoors, according to the Environmental Protection Agency (EPA), it makes sense that now more than ever, organisations want to explore how they can optimise their workplace from a health and wellness perspective.

While certifications such as the Well Building Standard and Fitwel have been more and more popular in recent years, both have developed new standards in response to COVID. WELL has introduced the Health-Safety rating, which builds upon the existing pillars within the Standard, focusing on five key themes: cleaning and sanitisation; emergency preparedness, which incorporates business continuity planning, building re-entry, and supporting resilience during emergencies; health-related services for occupiers; air and water quality management; and stakeholder engagement and communications. It is not confined to a particular type of facility and is customisable across 38 different criteria.

Meanwhile, Fitwel has launched a Viral Response Module as of the end of August, as an addition to its standard building certification. It provides annual, third-party certification of policies and practices, informed by the latest public health research on mitigating the spread of contagious diseases and incorporates turnkey policies that can be adapted to specific requirements. There are five chapters involved: leveraging buildings to migrate viral transmission; building trust in the workplace; addressing mental health within residential settings; optimising density for people; and addressing health disparities in the built environment.

While developers and tenants are reviewing their space requirements and looking to adapt their office space for flexible and remote working, the reality is that the need for connectivity and collaboration will ensure that the office market remains somewhat resilient during these uncertain times.

GLOBAL INSIGHT

Managing bioreactor lead times for success in biologics

Because of their long lead times, bioreactors can greatly influence a biotech project's critical path and affect the overall project timeline. Linesight has conducted in-depth market research to better understand the current conditions, drivers and future trends of the bioreactor industry.

Jeff Peragallo,
Director and Vice President of Operations

Nigel Barnes,
Director of Life Sciences

Ronak Shah,
Scheduling and Project Controls Graduate

With the global healthcare spend continuing to increase dramatically and projected to reach in excess of US$10 trillion by 2022, pharmaceutical companies are making significant investments in the research, development, and manufacturing of biologics, which are drugs that are derived in living organisms. Biologics projects consist of many elements, including the overall design, construction, and start-up of the entire facility, but one of the most important pieces of equipment involved in the manufacturing process is the bioreactor. Because of their long lead times, these reactors can greatly influence a biotech project's critical path and affect the overall project timeline. By focusing early on a bioreactor's design and development, clients can control one key aspect in ensuring the successful and timely delivery of biologics projects.

Key considerations

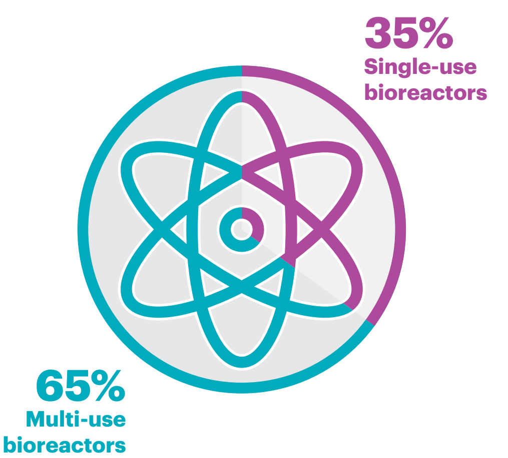
- Preparing for a project's success begins with understanding critical equipment lead times
- Bioreactors are major components in biologics facilities
- Developed by rigorously distilling project and market data, Linesight's diagnostic reveals vital insight into the impact of bioreactor lead times on the overall project timeline.

Investments in biologics are driven in large part by the global increase in life expectancy, improved access to medicines and the growth of non-communicable diseases, most prominently cancer, heart disease and diabetes. Spending on new cancer drugs alone is expected to grow by more than 50% over the next few years, with particular focus on the production of biologics. These biologics have revolutionised the treatment of many cancers and chronic conditions, such as multiple sclerosis, arthritis and rheumatoid arthritis, Crohn's disease and other autoimmune diseases.

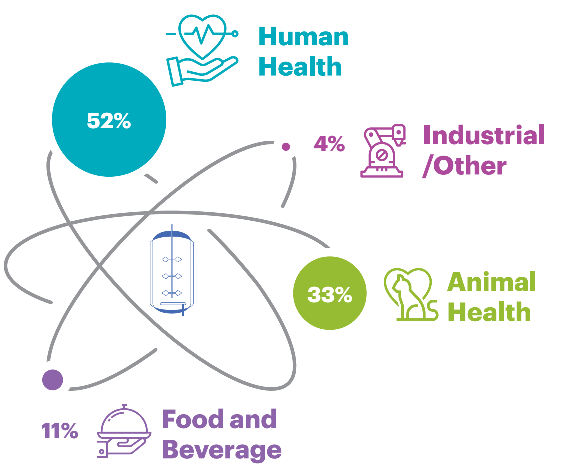
Additionally, established life science companies are upgrading their existing facilities to keep track with the latest regulations and technology. Start-ups are also joining the fray, as funding has become available based on the anticipated high return-on-investments. Thus, biologics manufacturing is expected to skyrocket over the coming years.

The manufacturing of biologics relies heavily on the use of bioreactors. A bioreactor is simply a vessel in which a chemical process, usually involving organisms or biochemically active substances derived from such organisms, is carried out. There are two types of reactors: multi-use and single-use.

TYPES OF BIOREACTORS BEING BOUGHT



WHO IS BUYING?



A single-use bioreactor, or disposable bioreactor, is a bioreactor that is lined with a disposable bag. A multi-use reactor is a vessel made typically of stainless steel or glass. With the full-on press of the pharma industry into biotech, the bioreactor market is red hot.

As such, with any significant investment, understanding the critical equipment and the lead times help our clients to better plan and prepare their projects for success. Our clients depend on us, as the market intelligence leader, to bring this insight to their projects.

To this end, Linesight created a diagnostic that was based on real-time data that was gathered through a survey administered to a cross-section of bioreactor manufacturers located across the globe. The respondents were business owners, operations managers, and sales managers with current project experience. The objective of the survey was to understand the current conditions, drivers, and future trends of the bioreactor industry.

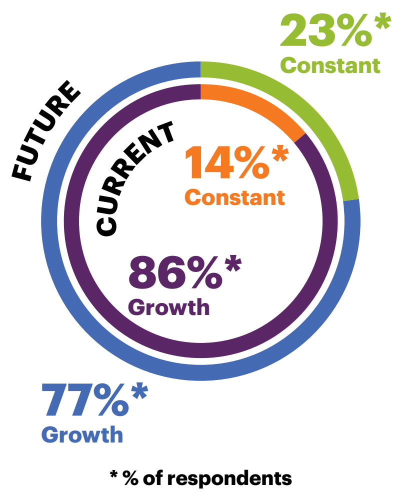
Insights and market forecast

Historically, the US and Europe have been the major consumers of bioreactors and continue to be in a strong position with robust demand. The US biologics market could, however, face possible threats to its vitality, depending on the US Presidential election and any incoming changes to policies regarding healthcare and drug pricing. The market in Asia, on the other hand, is having a major effect on the purchasing of bioreactors and is expected to see growth, with many of the bioreactor suppliers moving to the region to meet the demand. 80% of the reactor suppliers see the market increasing in activity, thus adding more pressure to lead times. The factors that are driving biologics are not expected to change if a global recession were to occur.

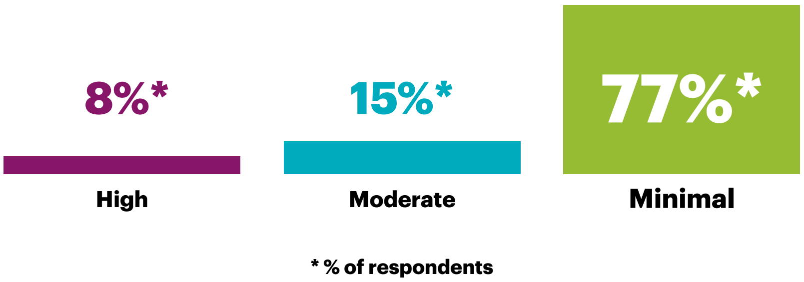
Conclusion

With their long lead times, bioreactors are driving the critical path of biotech projects. Though lead times are primarily influenced by reactor size and the manufacturers' supply chain, there are specific actions that clients can take to help minimise

MARKET CONDITIONS



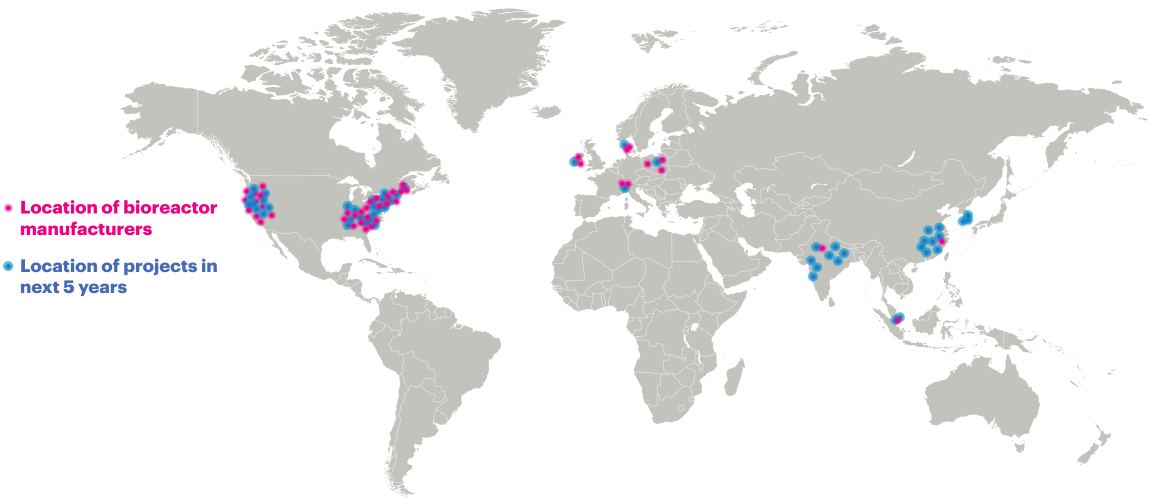
IMPACT TO MARKETPLACE IF GLOBAL RECESSION OCCURS



delays by **locking in their process design early**, providing **focused show drawing reviews** and **streamlining approvals**. Linesight has seen success with clients that have a strategic focus on sourcing. These sophisticated clients have engaged Linesight to bring industry and marketplace expertise to help implement and execute sourcing strategies that are aimed to deliver value across their programme of work. These clients have successfully leveraged their buying power and have strategically aligned with some of these reactor manufacturers to improve costs and lead times. The work does not stop at the sourcing stage; order management is equally important, where focus must be on maintaining regular contact with the manufacturer and visiting the fabrication facilities to ensure processes are on track. Understanding bioreactor lead times and working with construction consultancies that have experience in reducing delays on this critical equipment are proactive steps to ensuring overall success on biotech projects.

Please note that this study was conducted pre-COVID, so bear in mind that supply chains are disrupted and as a result, lead times may vary at this juncture.

WHERE THEY ARE VS WHERE THEY ARE NEEDED



GLOBAL INSIGHT

The true adoption of BIM - adding tangible project value?

Despite improved quality of information, as well as more accurate and speedier cashflow analyses being obvious advantages in the built environment, these benefits of BIM are often not realised to their full potential, due to implementation or adoption issues.

Diarmaid Connolly,
Associate Director

It is fair to say that BIM has been a topic of great interest within the construction industry over the last number of years, hailed as one of the core ways that we as an industry are embracing technological evolution, tackling inefficiencies, improving information quality and increasing design team collaboration. It is true that it offers a number of distinct advantages, and yet, as noted by John Hainsworth of Aurecon in his article, 'The promise of 'digital' won't be achieved by doing things the way we've always done things', with an array of definitions and a lack of clarity surrounding BIM, its full benefits are yet to be realised. John points to the fact that its implementation is often carried out in a file-based, transactional manner, with a truly collaborative approach absent and ways of working essentially the same as they have been traditionally – just using the technology to do the same things and missing out on the potential benefits.

At Linesight, the lack of willingness to fully adopt is something that we see on a global basis, although the extent does vary somewhat from region to region. We have adopted BIM on a global basis and invested heavily in its implementation, both in hardware and software, and in continuous staff training, to ensure that we are up to date with the latest developments and at the forefront in terms of its effective utilisation. Below is a summary of the key benefits that we see in the effectual use of BIM.

Speed and agility

The pace at which estimations can be produced increases considerably with the use of BIM, and this is one of the key advantages of its effective implementation. It enables the creation of option costs with greater speed, as well as the potential for live cost planning and modelling – introducing a level of agility with cost planning and estimating that has not traditionally been possible. Ultimately, this leads to faster decision-making and thus, a faster speed to market.

Accuracy and quality

Information accuracy and quality has been a particular challenge for the industry in recent years, with the UK's 'Get It Right' initiative finding that information errors cost the industry an estimated 5% of project value globally. In addition to the abovementioned speed and agility benefits, effective BIM implementation increases the accuracy with which cost estimating, planning and modelling can be carried out, by minimising the risk of human error, as well as supporting a higher quality of information. This in turn leads to a more cooperative project, as tenderers are much less likely to recover costs incurred due to poor or inconsistent information.

Increased productivity

While increased collaboration is often touted as a key benefit associated with BIM, this is not something that comes to fruition as often as one may think. The technology facilitates clarity, transparency and real-time sharing of information across the project team, coordinating information from various disciplines and eliminating version control issues, as well as keeping the lines of communication open. However, a proactive approach is needed across the team to actually realise these benefits, which is quite often lacking.

Cashflow

Managing and forecasting cashflow throughout a project is fundamental to its success, and traditionally, cashflow analysis is a lengthy and tedious process. From Linesight's perspective, this is one of the biggest advantages associated with BIM – its effective adoption facilitates more accurate speed forecasting by linking cost-loaded models and programmes, with more detailed models producing more accurate cashflow analyses. Ultimately, our early involvement in a project means that cashflow investment can often be deferred, which is particularly beneficial for projects with a large capital spend.

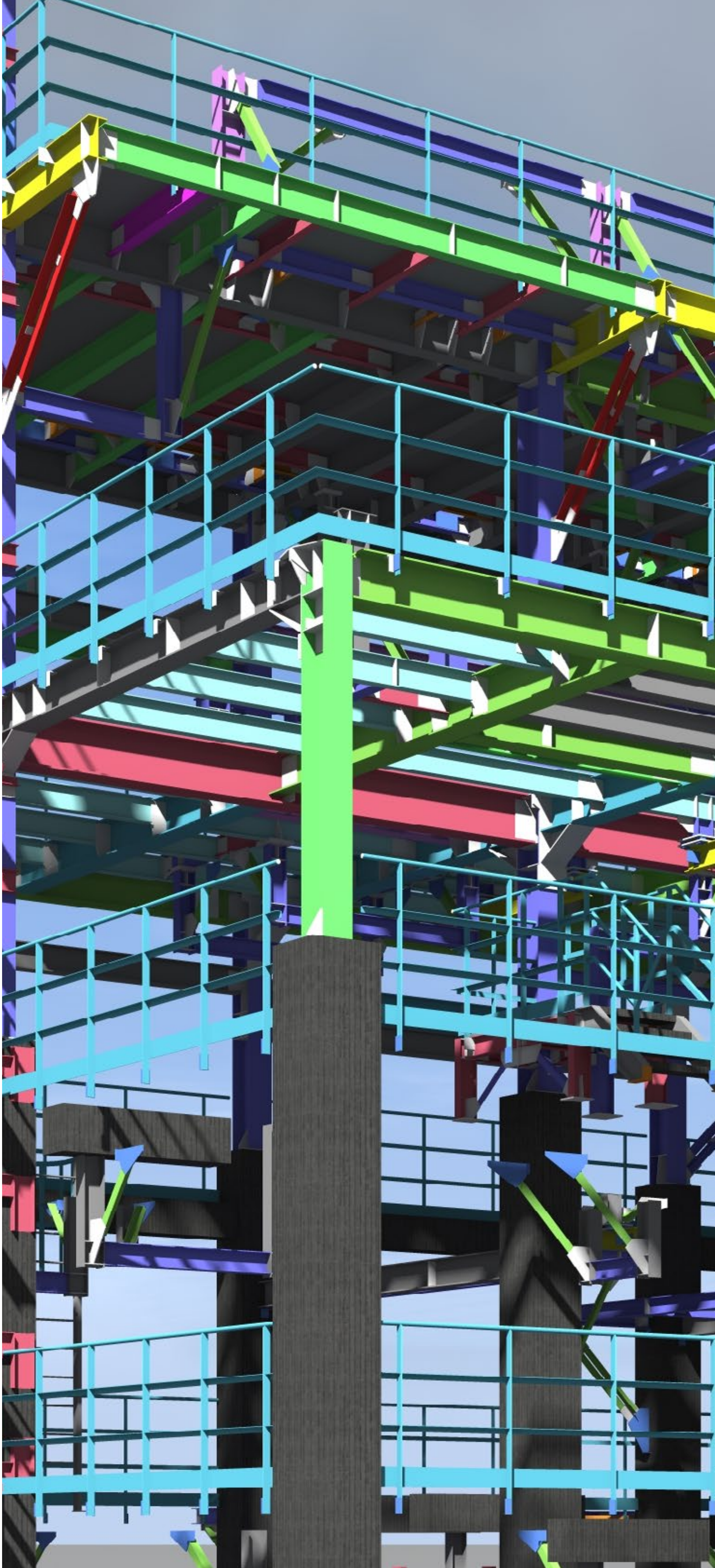
Cost intelligence

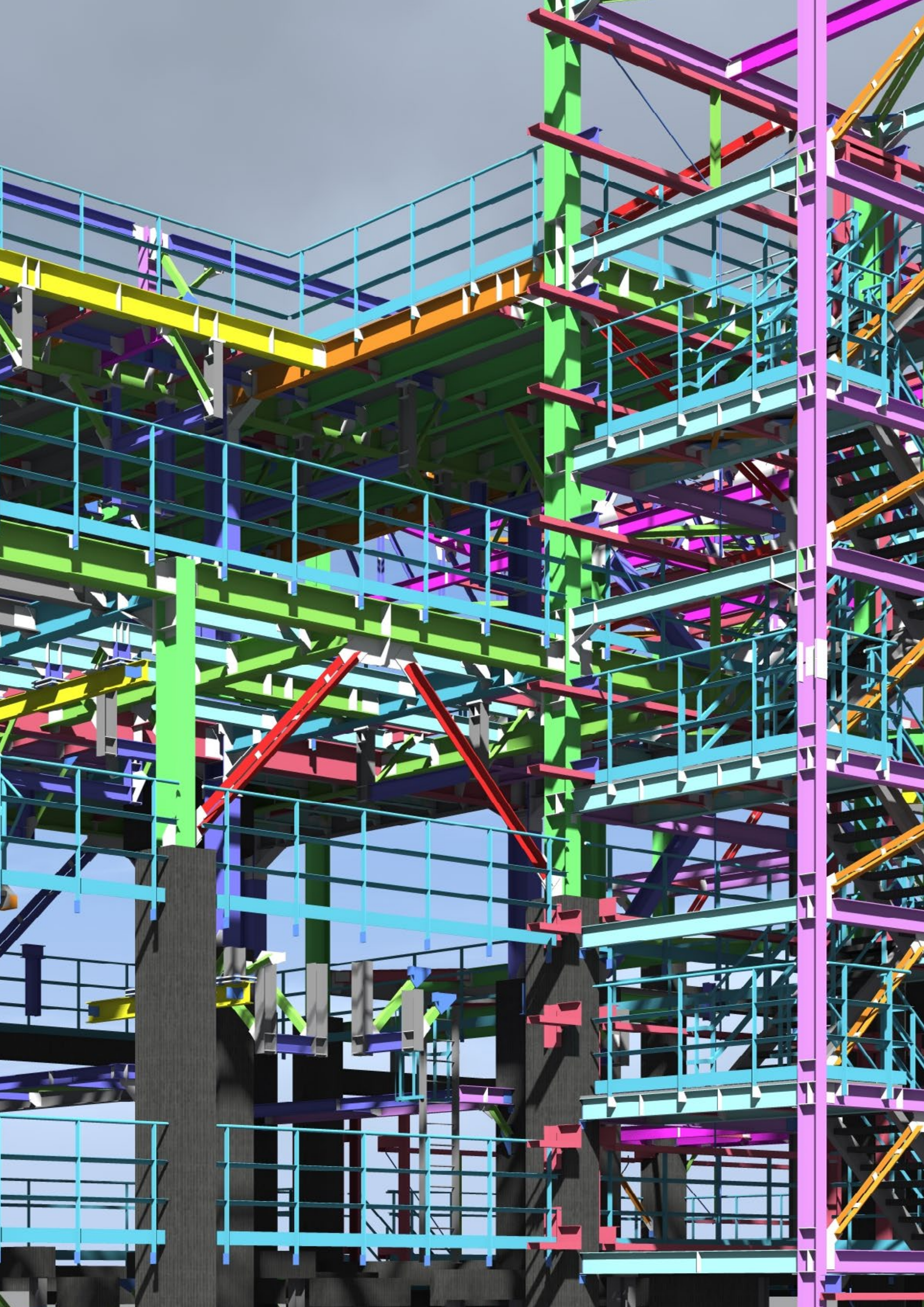
While benchmarking is not a new methodology, BIM facilitates it at a more accurate level as costs are broken down in more detail in the models, so by splitting the model, it allows us to benchmark specifics. However, by using BIM to its full potential, it pushes this further, to what we refer to as cost intelligence. With a deluge of complex data associated with projects nowadays, utilising the latest data visualisation tools brings this data to life in a meaningful way – illustrating trends and concepts in a quick and easy-to-digest format, allowing project teams and clients to draw conclusions from large volumes of data and inform effective decision-making.

In summary

While the benefits of BIM are often well-covered, these are not often realised to their full potential due to implementation or adoption issues. Ultimately, the technology is there, but not the willingness to take the leap of faith to truly adopt and trust the use of BIM. At Linesight, we believe that clients and design teams should consider this sooner rather than later, as the rewards are rich. We've made the jump and seen significant benefits in the built environment for our clients – are you ready for the leap?

Information errors cost the industry an estimated **5%** of project value globally.





GLOBAL INSIGHT

Keeping it Lean and bringing contractors along for the journey

Lean concepts have been applied with much success in many industries and service provider organisations around the world. But how can it positively impact the built environment and why has its adoption amongst contractors been relatively slow to date?

Jeff Peragallo,
Director and Vice President
of Operations

Pat Unger,
Associate Director

The landscape for the construction industry has changed immeasurably in the face of the current global pandemic, similar to almost all other industries. It would seem now more than ever, that Lean principles would be beneficial to help the industry navigate into the post-COVID world. Furthermore, with the ever-growing demands and complexities associated with the built environment, and the well-publicised productivity challenge within construction (more than 70% of all construction projects are completed late and over budget), it is evident that the industry requires some level of disruption to enable it to keep apace of the progress other industries are making in terms of efficiency. So, why is Lean Construction still not fully embraced by contractors, and what do you as an end-user need to be aware of that can lead to this reticence to adopt?

What is value, and how is it driven by Lean?

Value is defined as what the customer perceives as important and is willing to pay for. It comprises anything that moves the project closer to completion and that cannot be reworked. True value is the 'why' behind a project being undertaken and the desired outcome or objectives, and this typically extends beyond budgets and schedules. Lean focuses on the prioritisation of the operational needs and values of the users, while delivering on budget and schedule, promoting innovation that optimises value and eliminates waste.

Eliminating waste and inefficiency
Construction industry studies have shown that in excess of 50% of the effort required to deliver a project is typically non-value-added effort, or waste from the perspective of the client. By focusing on non-value-added activities, processes are constantly reviewed for any waste or inefficiency, and what the client-led value objectives are, to achieve true alignment. Ultimately, it leads to productivity gains, optimal ways of working and the optimisation of project outcomes.

Nurturing a collaborative culture
Traditionally, construction is a combative industry – teams work in silos, the built environment is increasingly challenging, and as referenced above, productivity is stagnant. A combative culture will derail Lean, and will often have tangible impacts on a project, both in terms of cost and schedule. The Lean concept turns this on its head, championing collaboration, trust and open communication between all members of the project team, streamlining the efficiency of the project team and giving the highest chance of collective project success.

Streamlining the workflow and project delivery
Not only does Lean remove waste and inefficiency, while facilitating early engagement, consistent collaboration and constant communication, but these factors intuitively streamline the workflow. Furthermore, the use of methodologies, such as modular and prefabrication, support fast-tracked delivery, as well as optimising the capital spend.

Why are contractors slow to adopt Lean?

Contractors play a key role in the adoption of Lean, as they are responsible for the key facets of a project, including cost, schedule, safety and quality. And yet for the most part, general contractors have been somewhat slow to embrace it. Why is this the case?

A fundamental, organisational change
Lean is a significant change for any business, and can be perceived as a somewhat abstract methodology for those from a traditional construction background. It essentially changes the contractor's organisational approach at its core, and so it must be fully bought into and believed to be achievable to facilitate such a fundamental change.

Tight profit margins versus perceived cost
Construction contractors typically operate on a relatively tight net profit margin before tax, sitting around the 3% of revenue mark. Inevitably, the perceived costs associated with the necessary training and implementation of Lean will be a particularly important factor in this case, and may play a hand in its slow adoption as a result. Any potential adopter will need a good understanding of what level

of productivity loss they should expect during the learning and implementation phase.

An elemental approach
Lean's main allure for the construction industry comes in the use of elemental and relatively inexpensive tools, which again taps into its inherent value. Breaking activities and tools down will be cost-efficient but effective. A platform like Last Planner is an example of one of these tools.

What is the value to the contractor?
Similar to the client, Lean offers a distinct value proposition to the contractor, and again, the value relates to productivity. In an industry in which productivity is poor and wages account for a substantial proportion of total revenue, a marginal increase in productivity arising from a methodology such as Lean will have a significant impact on profit. For example, a 10% uplift in productivity in a business, with 3% average profit where wages amount to 35% of total revenue, will double the profit.

Furthermore, achieving improved productivity helps to mitigate against risk in a business that is inherently risky and competitive, and so it is hard to understand why the adoption rate is still remarkably low. However, the general consensus is that these distinct benefits have been lost in translation along the way, and that hard facts and statistics are needed to address this in terms of which contractors will be receptive.

What Lean techniques and practices are particularly relevant in a post-COVID world?

While the benefits that off-site methodologies can offer is relatively well-known, the potential for OSM to counteract some of the productivity challenges arising from COVID

measures (for example, reduced capacity on-site due to social distancing) is significant. Another system worth referencing in this regard is Last Planner, with its capabilities to produce a predictable and efficient work flow all the more pertinent with the current challenges being faced in the industry.

Conclusion

While we see Lean being readily adopted in some sectors, it is typically more widely accepted in manufacturing and industrial-type verticals. This is because the Lean concept is ingrained in their background, and as a result, it is second nature. For contractors, Lean can represent a daunting and costly investment, but it is evident that the derived benefits of adoption are worthwhile. There are many examples of contractors embracing the methodology to its full effect, and perhaps part of the solution lies in learning from peers and allies, exploring case studies of what has worked well in the adoption approach.

While overall, challenges to its widespread adoption remain, the benefits of Lean to projects and the construction industry as a whole are clear. It promotes the elimination of waste and inefficiency, nurtures a collaborative culture and streamlines the workflow and project delivery. In bringing the concept to the forefront, Lean becomes a client-led objective, with a clear statement of the intention to embrace the Lean approach to all members of the project team at an early stage. It must be implemented through a systematic, process-driven and program-based approach. Ultimately, there's a great deal to gain by innovating project delivery. The Lean methodology has a lot to offer, which begs the all-important question: where are you and your organisation on the Lean journey?

GLOBAL INSIGHT

The rise of the smart hotel

Intelligent buildings are not a new concept, but the level of advancement is gathering pace and the increasing adoption of smart technology is spreading across multiple sectors.

Andrew Callaghan,
Director

Des O'Broin,
Director

Hugh McElvaney,
Senior Quantity Surveyor

Intelligent buildings are not a new concept, but the level of advancement is gathering pace and the increasing adoption of smart technology is spreading across multiple sectors. While these core drivers impact every sector, the influence of technology and shifting demands is particularly significant within the hospitality sector, as it shows a marked shift towards integrating these technologies into the latest developments. This boils down to a few key factors, as discussed below. It is important to bear in mind that while the sector is currently struggling with the impact of COVID, it will recover in the coming years as the world adjusts to the 'new normal', and smart technology will play an even more important role in its recovery and success.

The hyperconnected guest

One of the most fundamental drivers behind the trend for smarter hotels comes in the form of the rise of experience consumption, which is a key catalyst in a sector wherein consumer needs are front and centre. As noted by Alex Witkoff, Executive Vice President of Witkoff Development, at Bisnow's Hospitality Investment, Development and Management Summit in New York earlier this year, "Spending on the experience economy is expected to reach $8 trillion by 2028". The experience is becoming even more important to the guest and optimising this can make all the difference against an increasingly competitive landscape. Recent reports actually suggest that 2020 will be the year that customer experience overtakes price and product as the key brand differentiator.

There is a plethora of ways in which intelligent technologies can be leveraged in order to optimise the guest experience, but the crucial aspect is its ability to tailor and personalise their stay. Indeed, 86% of consumers say personalisation plays a role in their purchase decisions, according to recent Kahuna survey, and brands that incorporate personalisation by integrating data and advanced technologies report revenue increases of 6-10% (Qubit). Ultimately, Millennials or Generation Y form a very significant proportion of the target market, influencing the design of new hotels, from incorporating new technologies to the inclusion of co-working areas.

Customer expectations are evolving in line with their adoption of technology in their day-to-day lives. Guests are using technologies, from streaming services and smart assistants to remote climate control in their homes, so the expectation that hotels will have the infrastructure to support and match these technologies is taking hold. They expect the ability to tailor their experience to some extent, and to have the autonomy to control their space and hotel experience, including:

- Climate and temperature control
- Temperature for showers
- Curtain/drapes/blinds
- Entertainment systems
- Hands-free, voice-control
- smart assistants
- SmartBed™ technology
- Smart self-check-in/check-out kiosks

Needless to say, it is now the norm to interact with multiple devices at any given time.

Furthermore, hotels are now in a position to collect and analyse insightful data, and to anticipate, manage and understand guest preferences, in order to enhance the guest experience. Data-driven insights will help to personalise the experience and guide service provision.

Guiding operational efficiency

The second key driver lies in operational efficiency. Integrating smart technologies, from the simple occupancy detection systems to the more complex smart phones operating the lights and electricity within a room, keyless access and mobile check-in — these measures are proving to offer tangible benefits to the running costs of a hotel. We are moving towards the concept of a truly connected hotel, by leveraging Internet of Things (IoT) technology to ensure systems work together and communicate to deliver efficiencies in all areas. This extends from robot butlers delivering your room service to digital door signage functionality, to allow housekeeping staff to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Sunny
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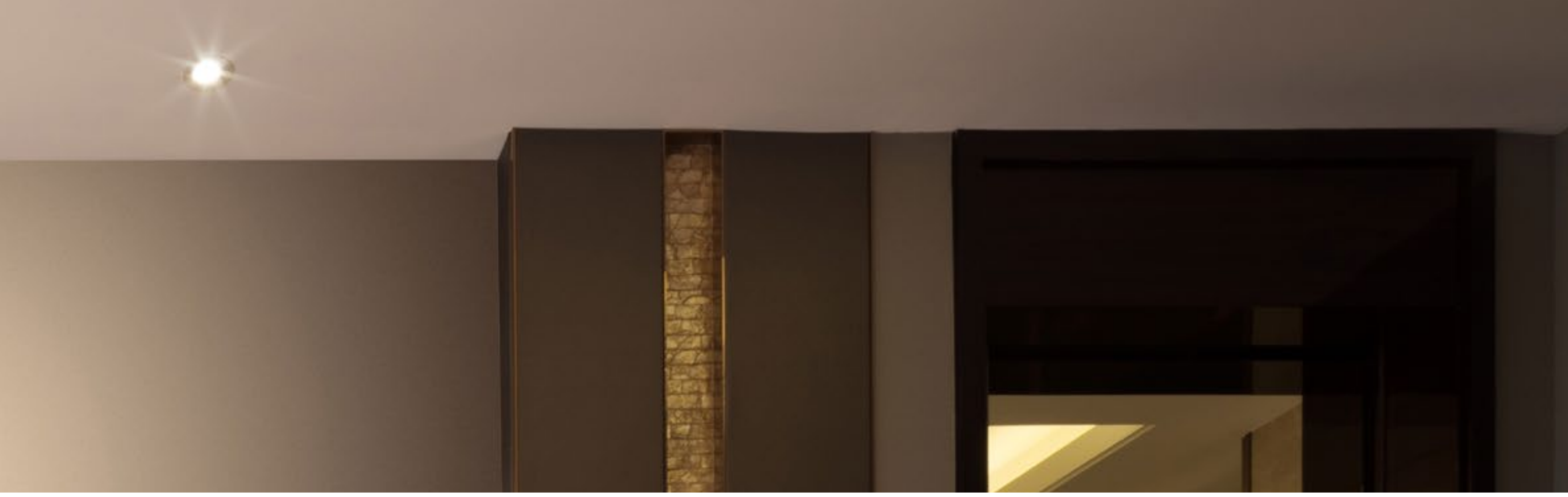

remotely see the rooms to be cleaned and devise an efficient workplan around that live data.

Smarter hotels in practice

Yotel, Citizen M, Best Western and Wynn Resorts are just some of the names adopting and promoting these new technologies. Marriott International is often perceived to be leading the charge in this regard across its 30 brands in 126 countries, from integrating keyless access on a widespread basis, to continuing to work on its connectivity and adoption of smart technologies via its IoT Guestroom Lab within its Innovation Lab. An example of how it is implementing this technology in practical terms lies in the Aloft Hotel chain, which sits under the Marriott umbrella. Linesight was a part of the team that delivered its Dublin City branch last year, with some interesting and forward-thinking technologies delivered as part of the project:

- Mobile check-in
- Keyless access via an app
- Wireless printing facility in reception
- Large video walls to reception and bar area
- USB charging sockets
- Integrated international adaptors in guestrooms
- A fully-integrated VRF AC system, controlling the room temperature and power supply to the room
- An integrated door sensor for room access. Once the room is activated by the guest's smartphone, the power is automatically supplied to the guestroom and the VRF system comes online and goes offline automatically when the room is unoccupied for any length of time
- An automated minibar system - once an item is removed, if it is not returned within a certain time period (can be set by the operator), a charge will be applied to the room for that item
- 43” smart TVs in all bedrooms with a casting system for the whole hotel, to allow guests to watch content from their own devices
- A room service robot named ‘Lofty’ or ‘Botlr’. Once an order is made and placed, the robot travels to the lift, which it calls wirelessly on its way to the room. Once it arrives, the room phone will ring and inform the guest that the order has arrived

Costs

There are reasonably significant costs associated with upfront investment in these technologies and systems, including high-speed WiFi everywhere and boosters for the latest 5G mobile coverage, but the pace of demand for smart hotels and the latest technology is on the increase.

In summary, the hyperconnected guest, and their needs, evolving habits and expectations are driving the shift towards smart hotels. In their ‘home away from home’, they expect an integrated experience that aligns with the technology that they have become accustomed to in their day-to-day lives. Hotels should leverage the data that they can now readily collect to glean meaningful guest insights, and to anticipate and better manage guest preferences. Room presets based on loyalty scheme guest accounts can have the room set-up for guest preferences, including temperature, lighting and even minibar contents.

From an operational perspective, there are a multitude of benefits that arise from integrating smart technologies, from streamlining running costs and optimising operational efficiency, to reducing power consumption, and playing its part in making the hotel a more sustainable facility.

What we do

Our services are tailored for your project, delivering maximum efficiency from inception to completion. We specialise in key areas, to provide faster project delivery, greater cost efficiency and maximum value.

Project Management
Delivering project success through strategic planning and stringent controls.

Cost Management
Driving better value for money at every stage of the construction process.

Program Management
Managing a network of projects simultaneously in order to deliver program success.

Project Controls
Controlling every aspect of a project to deliver maximum performance and long-term success.

Procurement
Adopting the most appropriate strategy to suit both public and private sectors.

Supply Chain Management
Providing efficient logistic strategies to streamline the delivery of equipment and services.

Health and Safety
Securing compliance, and providing design teams and clients with expert advice and independent review.

Consultancy
Providing professional, hands-on advice and guidance throughout every stage of your project.

Planning and Scheduling
Providing an initial project overview, developing a detailed structure and identifying schedule controls.

Monitoring and Due Diligence
Independent examination of project information, identification of risks and compliance issues, cost verification checks and ongoing monitoring of project milestones.

Our values

Over the years we have developed a way of working that ensures quality and consistency in how we operate. Our five core values inform what we do and how we do it:

Partnership

We are focused on our clients' goals and work closely with them to achieve the best possible results. We believe in collaboration. When we share our experiences and combine our expertise, we can achieve great things.

Progress

We believe in always moving things forward and finding better ways of working. We're not just focused on what we do but
also on what we can achieve. We are driven by success – for our clients, our partners and each other.

Integrity

We are fair, open and ethical in everything we do. We challenge things we believe to be wrong and are open to being challenged by others. We take pride in the quality, accuracy and independence of our work.

Resourcefulness

We work around the world, in diverse sectors and for clients with distinct ambitions. This requires us to act effectively and creatively in new and complicated situations. We rely on our individual and collective abilities to resolve any challenges we may face.

Long-term view

We believe in working sustainably, and so we build enduring relationships with our clients and partners. We work together in a way that is respectful and considerate of each other and the wider society in which we live.

Our culture

Our **bold ambition, honesty** and **confidence to deliver,** together with our commitment to cultivating **meaningful relationships** is what sets us apart.

Our distinctive culture has always played a key role in our success. As a business we want to be intentional in maintaining and working within the principles of our distinctive culture.

Own and empower

We have a highly developed sense of responsibility for identifying problems, finding solutions and executing with excellence. As individuals and teams, we are free (and encouraged) to exercise our judgement to reach our goals.

Connect for good

We are team players, collaborating globally and locally to deliver exceptional results. We encourage and nurture relational rather than transactional business relationships, continuously building a totally inclusive working environment.

Embrace clarity

Our emphasis is on direct communication - our preference is always face-to-face, or to pick up the phone. We express ourselves clearly, honestly and effectively in our communication. We are pro-active in inviting and providing actionable feedback.

Lead by example

We believe in mentoring as a way to strengthen and develop ourselves and provide the resources, environment and flexibility required. We practice 'reverse mentoring' between junior and senior employees - every single person in Linesight has something to teach.

Bold ambition

We continuously develop our global team, with a shared drive and ambition to deliver exceptional results. We believe success is winning unreserved recommendations for exceptional work and impact. We always work with an eye on the future, whilst delivering on our commitments and objectives.

Working with you, wherever you are

With staff located across Europe, MENA, Asia Pacific and the USA, our reach is truly global. We have delivered projects in over 40 countries and are always exploring new areas of opportunity. We offer first-class consultancy on major projects across 13 specialist sectors, and we have developed a broad portfolio of innovative projects in every region.

- Commercial Development
- Commercial Fit-Out
- Data Centres
- Education
- Food and Beverage
- Healthcare
- High-Tech Industrial
- Hospitality
- Life Sciences
- Residential
- Retail
- Student Accommodation
- Transportation and Infrastructure

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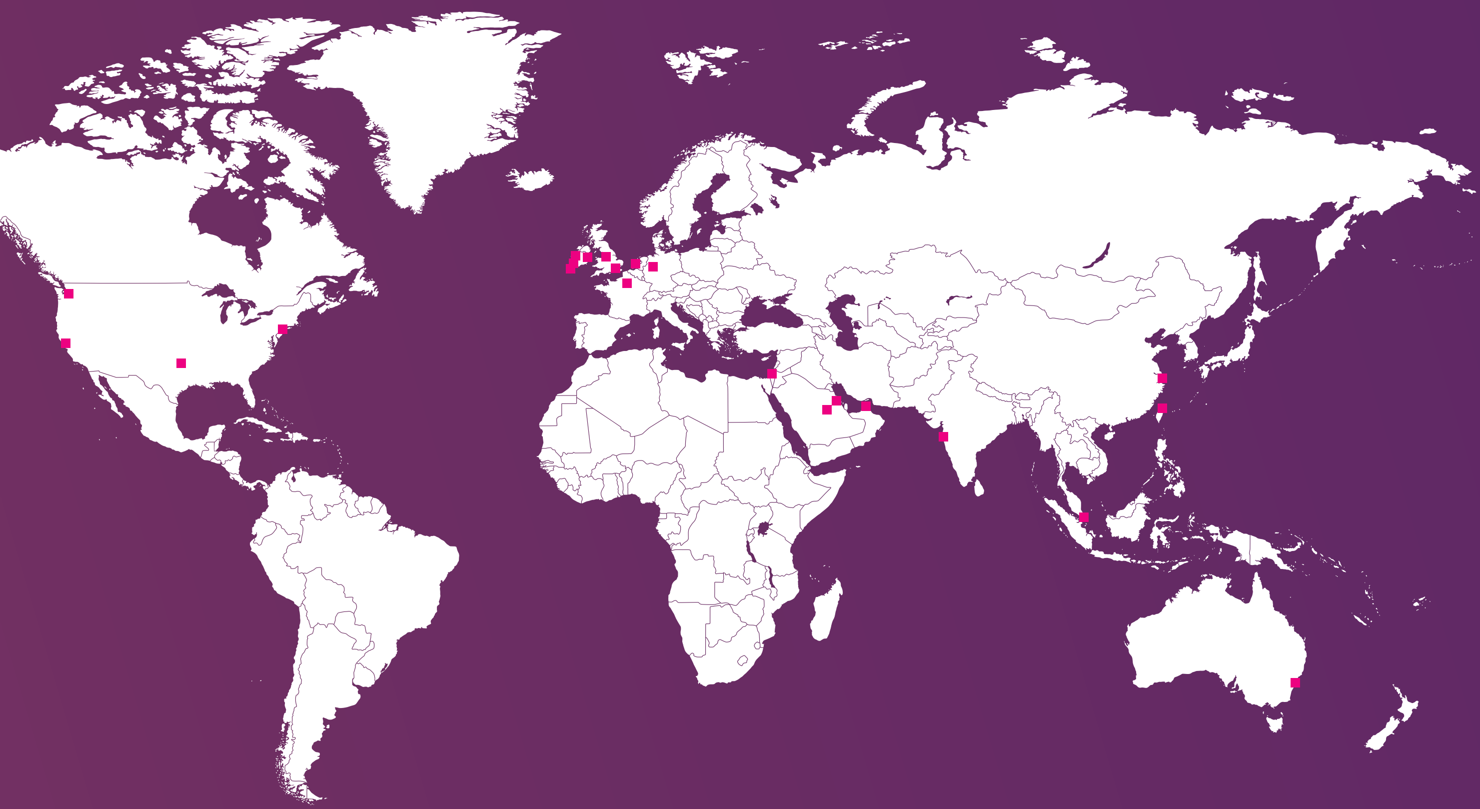

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A special thank you to all those involved in this year's publication.

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