

INDUSTRIAL CAPITAL EXPENDITURE SURVEY 2017

INVESTING AND BUILDING IN CHANGING MANUFACTURING MARKETS





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1. FOREWORD

It is my pleasure to introduce the Arcadis Industrial Capital Expenditure Survey 2017 - Investing and building in changing manufacturing markets.

With Industry 4.0 advancing as a catalyst for change for today's manufacturing industry, changes in this already dynamic and fast moving environment are expected to be more extensive and rapid than ever before.

This comes at a time when global manufacturers are already working hard to keep pace with fast changing consumer demands, due to global socio economic factors, such as globalization, population growth and emerging market dynamics, to name but a few.

Whether it be changes in the labor force, new technology and systems, digitization, or robotics, the need to increase efficiency and reduce costs, while improving speed of getting products to market, is of paramount importance.

Despite limited capital, manufacturers must invest in building and upgrading built assets and facilities to meet changing demands. And with the new speed of business analytics and insight into responding to market, these facilities are expected to be built quicker, with more flexibility, and at less cost.

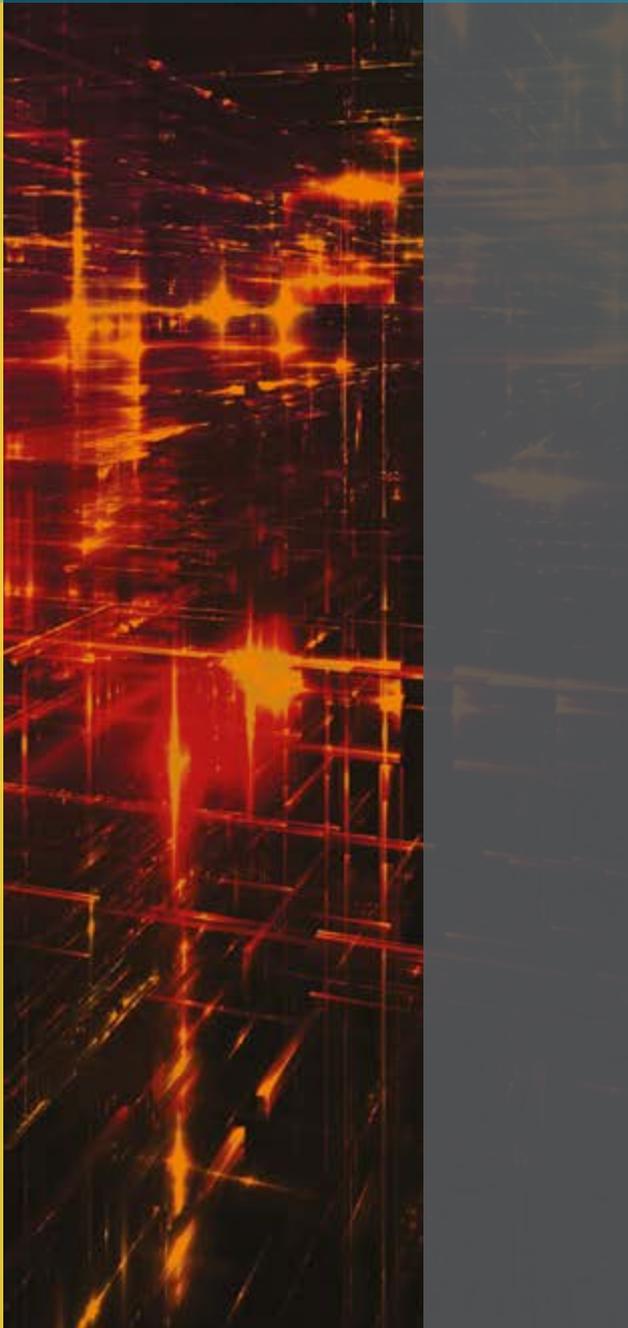
At the same time, Industry 4.0 continues at pace, in which end-to-end manufacturing value chains are becoming seamlessly connected, underpinned by further digitization, technical advances in big data and data analytics, the Internet of Things, robotics, artificial intelligence and driven by the exponential growth of computational power and available information. We are witnessing the world moving towards more on-demand processes, enabled by technologies such as additive manufacturing and real time big data processing.

This all requires 'Smart Assets', that not only support and drive, but also effectively improve business performance.

Flexibility and resilience in built asset portfolios and overall value chains are key, as is the need to ensure responsible use of natural resources and safe and sustainable operation of assets, in line with corporate brand values.

This has a fundamental impact on the way manufacturers design, create, operate and eventually re-purpose their built asset portfolios, whether it be the manufacturing plant, the Research and Development centre, or the infrastructure that supports it.

Reaching out to over 70 leading industry experts in manufacturing across the world, our report provides insight into the latest trends in built asset capital project and program delivery across the industrial manufacturing sectors. It assesses companies and



sectors to see how ready they perceive themselves to be to respond to today's challenges brought by Industry 4.0. It also provides a seven-step route to success for manufacturers to improve their capital delivery and gain a competitive advantage.

Our findings present an overall picture of pragmatic optimism, with manufacturers confident in the value their capital investments in built assets bring to their wider business. However, with constraints on available funds ranking as the top challenge to capital projects, it is crucial that companies learn from peers and take best practice from other sectors, to meet the affordability challenge and maximize the value of built assets delivered, in the midst of a transforming supply chain.

I hope you find the report as informative and engaging as our experience was in producing it. Amidst the current, rapid changes in the manufacturing industries, it is great to see how we all can learn from our views on the challenges at hand, noting similarities and differences from various perspectives. I would like to thank the industry leaders who shared their insights and contributed to this research, and Ipsos MORI for their insightful research program.

Tjerk van der Meer

Global Sector Leader
Industrials, Conglomerates & Consumer Goods

“Ipsos was delighted to work with Arcadis to conduct a pioneering exploration of the trends in capital planning and delivery in industrial manufacturing markets. As part of a cross-sector, global exploration of these important issues, we spoke with senior executives from world-leading manufacturers facing the imperative of spending significant capital budgets in a world of shortening time horizons and ongoing technology disruption. This approach has enabled Arcadis to provide a detailed picture of the behaviors and attitudes of a diverse mix of companies, identifying common themes, trends and benchmarks, as manufacturers seek to meet the commercial and operational pressures in a rapidly changing market.”



2. EXECUTIVE SUMMARY

In a revolutionizing industrial landscape, it is evident that many manufacturers are looking to embed their built asset capital programs into their core value chain of delivering product to market.

Working with world leading companies across a wide range of industrial sectors, Arcadis is in a unique position to share our record of best practice methodologies.

In this report, we pool that knowledge to provide insight into how the industrial sectors, as a whole, are planning and delivering built assets around this changing landscape - and how individual companies are performing in the context of their peers.

Partnering with Ipsos MORI, this new research shares how built asset capital programs are being planned, delivered and managed across the industrial manufacturing sectors.

Our findings depict a positive outlook across the industrial sectors, in which capital programs are clearly viewed as significant drivers of value for businesses as a whole.

Highlighting which sectors are adopting best practice, the report reveals seven key themes and trends, which best-in-class manufacturers must navigate to be better able to deliver to future market demand:

A summary of the seven key themes and trends:

1 Better returns and improved speed to market:

A healthy 88% of companies are confident that they can demonstrate the value that their capital investment projects bring to the wider business. However, only one in four companies adopt best practice and benchmark against peers and only one in five benchmark cross-sector. This raises the question of whether there is opportunity to improve confidence in competitive performance by conducting benchmarking both within their industry and in other sectors.

2 Flexibility and agility: With increased flexible manufacturing requiring agile facilities, a mere 52% of companies believe that their portfolio of facilities is flexible enough to meet the challenges facing their business. This is despite 60% of companies having a multi-year investment plan in place, which was positively linked to higher confidence in the flexibility of assets. This lack of flexibility suggests a fundamental risk for the industry in both remaining competitive and getting product to market on time.

3 Sustainability in capital programs: Six in ten global companies rated reducing environmental footprint as significant in how they approach major capital investment projects. Meanwhile, all companies in the chemicals sector rated this as significant, likely due to a mix of regulatory and societal pressures. We expect

to see this demand increase as global environmental standards are applied.

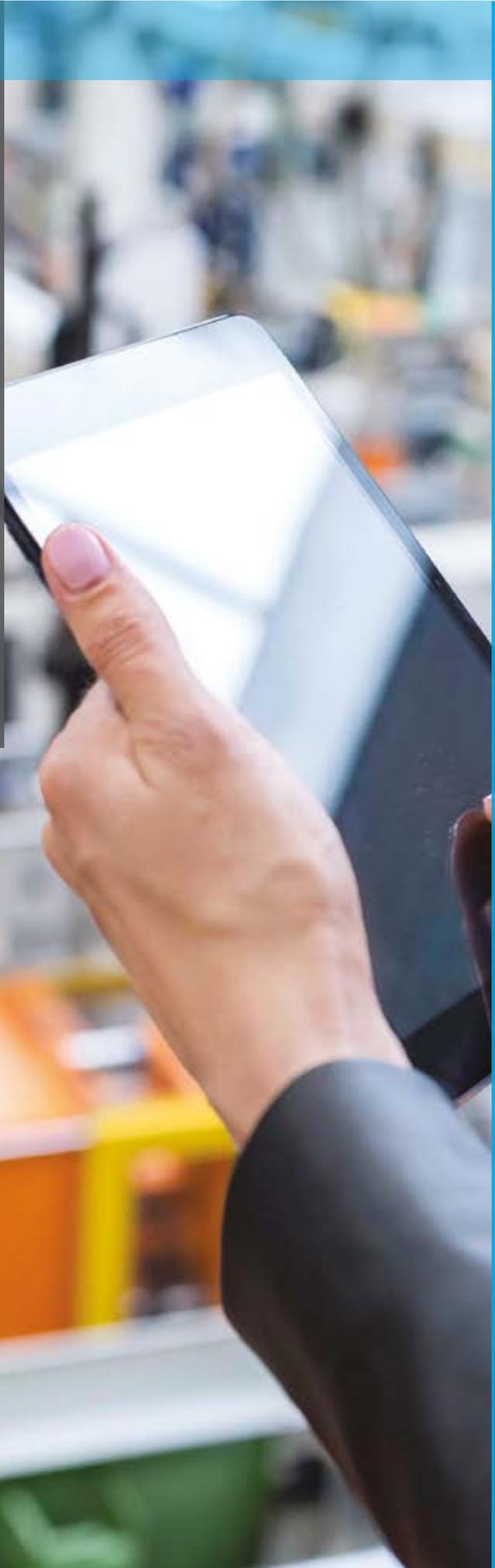
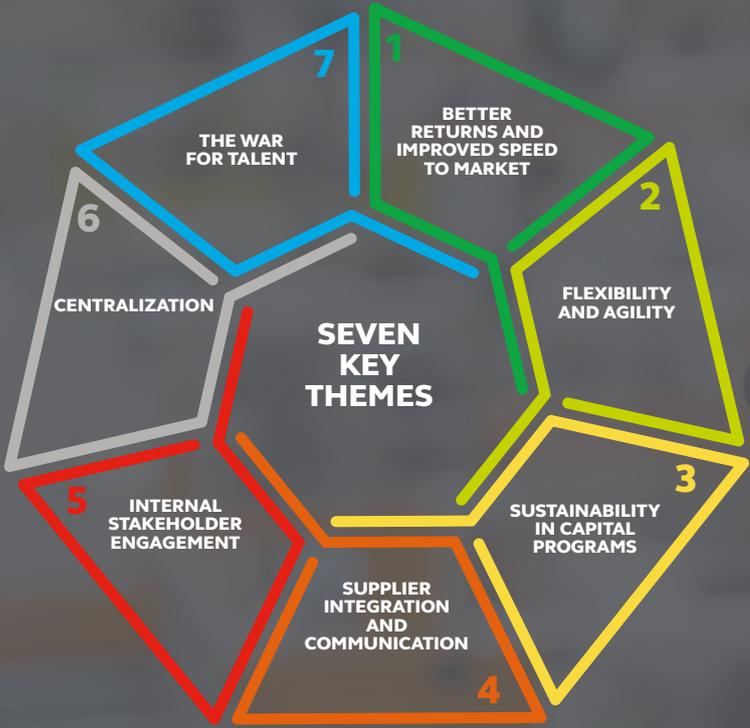
4 Supplier integration and communication: The majority of companies take or are looking to take an integrated, enterprise-wide approach to managing supplier relationships. However, many companies do not fully communicate and engage with their suppliers; only 57% reported that they shared their project goals with suppliers and less than half shared their wider business goals. This may link to one in three companies reporting a significant dispute with a supplier in the last two years. Enhanced communication and objective sharing will help avoid disputes and project failures, and ensure a better integrated value chain that is oriented towards the end customer.

5 Internal stakeholder engagement: Only around half of companies believe that they are good at engaging their internal stakeholders on capital investment programs. Better collaboration and communication was identified as the most significant factor to improve stakeholder engagement and the successful outcome of projects

6 Centralization: 62% of industrial manufacturing companies make decisions about capital investment projects centrally, and 89% of companies have a central, enterprise-wide investment board. The heavy industrials sector leads the way in this trend, with all respondents from this sector reporting that these decisions are made centrally.

7 The war for talent: Over half of companies say recruiting and retaining the right people to plan and deliver capital investment programs is difficult and 42% of companies report this has become more difficult over the last two years. While working closely with universities will improve this, it is only a small part of the solution and companies are looking to different avenues to attract and up-skill talent.

In this report we examine these trends and what they mean for manufacturers' end-goals of getting their products to market and innovating cutting-edge product lines. We go on to discuss seven practical steps that companies can take to pro-actively respond to these trends, using insight from our experts who regularly partner with high performing organizations and takes learnings from across sectors.



3. RESEARCH OVERVIEW

3.1 INTRODUCTION TO THE RESEARCH

We interviewed 73 executives at industrial manufacturing companies from across the globe, all with a responsibility for managing their company's capital delivery programs. Together, the respondents represent leading manufacturing companies generating over US\$300 billion in revenues each year, spanning the automotive, pharmaceutical, chemical, building and metal, heavy industrial, fast moving consumer goods (FMCG - including food and beverage) electrical, engineering and general manufacturing sectors.

The interviews were conducted by Ipsos MORI in 2016, and focused on key aspects in capital delivery to identify how companies manage and optimize their capital expenditure (CapEx) programs and the challenges they are facing in responding to market and business disruptors.

According to UNIDO, global manufacturing output was expected to increase by 2.8% in 2016. Manufacturing production was likely to rise by 1.3% in industrialized countries and by 4.7% in developing economies.

At the same time, global CapEx has been struggling to make headway over the past couple of years. Global non-financial CapEx spending totaled \$2,702 billion in 2015 and is forecast to drop to \$2,541 billion in 2017.

With manufacturing increasing but investment falling, a gap is being created that, if not addressed, will result in manufacturers not being able to meet demand. This gap will only widen if this trend continues resulting in huge missed opportunities.

This already challenging CapEx environment sits against a backdrop of key industry drivers that are influencing how industrial manufacturing companies plan and construct their facilities: digitalization, automation and technology advancement, forming Industry 4.0, globalization, consolidation and a war for talent.

It is evident that many companies are already responding to these challenges. Yet there are few sources of insight into how the industrial sectors, as a whole, are responding and how individual companies are performing in context of their peers. Our research addressed this by providing unique insight into how the each industrial sector is responding, and makes overarching comparisons between sectors, indicating where companies can learn from both their peers and other sectors.

Figure 1: Global non-financial CapEx (2003 – 2017F)



Source: S&P Global Market Intelligence, S&P Global Ratings.

Note: Figures are rounded to the nearest whole number

¹ <http://www.unido.org/news/press/global-manufacturing.html>

3.2 INDUSTRY OUTLOOK

In the midst of a revolution, industrial manufacturing executives are positive about the overall future of their industry: more than one-third (36%) believe that their sector will improve over the next year, and over half (51%) say that their sector will remain the same (see Figure 2). These are encouraging signs following the low-growth years in the wake of the global financial crisis and a recent downturn in CapEx spending, led in a large part by normalization after the commodities boom.

Despite this general optimism, executives retain a degree of caution when it comes to managing their capital investment projects. The largest challenge, according to more than one-quarter of the interviewed executives is the lack of available investment or finance. And one in five also reported that talent recruitment is a key challenge (see Table 1).

On top of juggling these day to day challenges of CapEx, companies are starting to think about the future and the impact new technology and socio-economic factors will have on their capital investments to remain competitive.

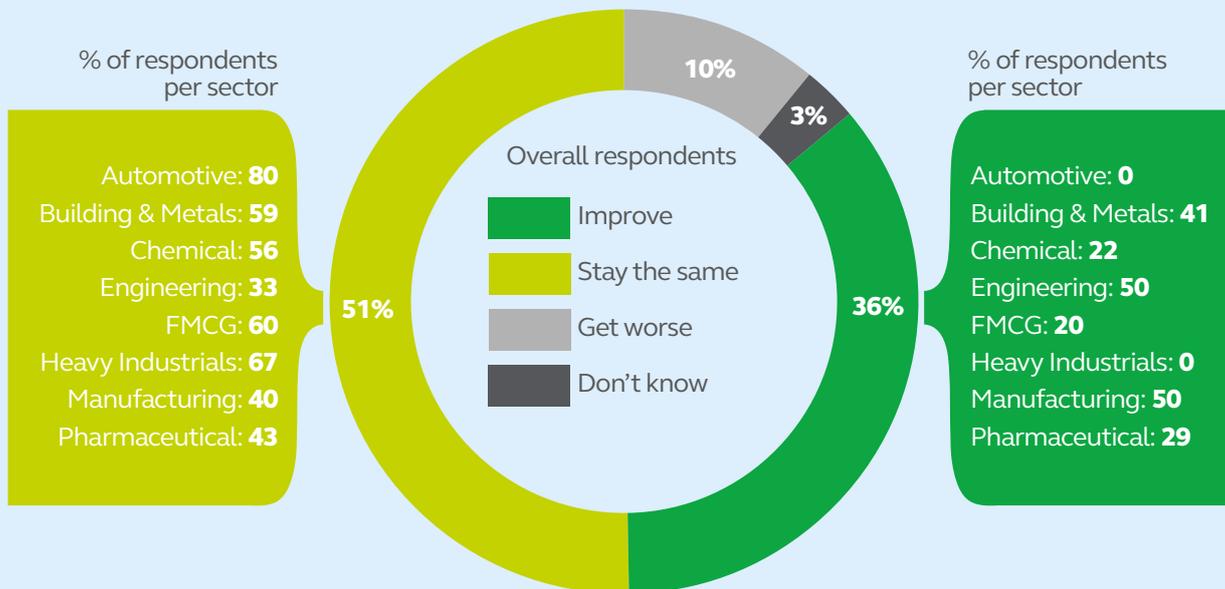
Table 1: The top five challenges in managing capital investment projects

	CHALLENGE	% OF RESPONDENTS
1	Availability of finance	27%
2	Lack of available talent	21%
3	Increasing production costs	15%
4	Demonstrating return on investment	12%
5	Quality of service/product	10%

"The key challenges for us are to grasp the industry trend in time, the emergence and use of high-end technology and the lack of high-end talent."

Automotive, China

Figure 2: Overall, do you think the outlook for your sector will improve, stay the same or get worse over the next 12 months?



"The biggest challenge is to generate cash to invest because the market is sluggish."

Building & Metals, France

Note: Figures are rounded to the nearest whole number

4. SEVEN KEY THEMES AND TRENDS

4.1 BETTER RETURNS AND IMPROVED SPEED TO MARKET

Unsurprisingly, 80% of respondents say that return on investment (ROI) is a significant factor in how they approach capital projects and 'profitability' is the most commonly used performance metric, according to 62% of executives.

A resounding 88% of participants say they are confident that they can demonstrate the value that capital investment projects bring to their wider business. This confidence extends to the performance of their asset portfolio in ROI, which 66% rate as 'good' or 'very good' (see Figure 3), led by the chemicals sector, in which a compelling 89% of companies reported the ROI of their built asset portfolio as 'good' or 'very good'.

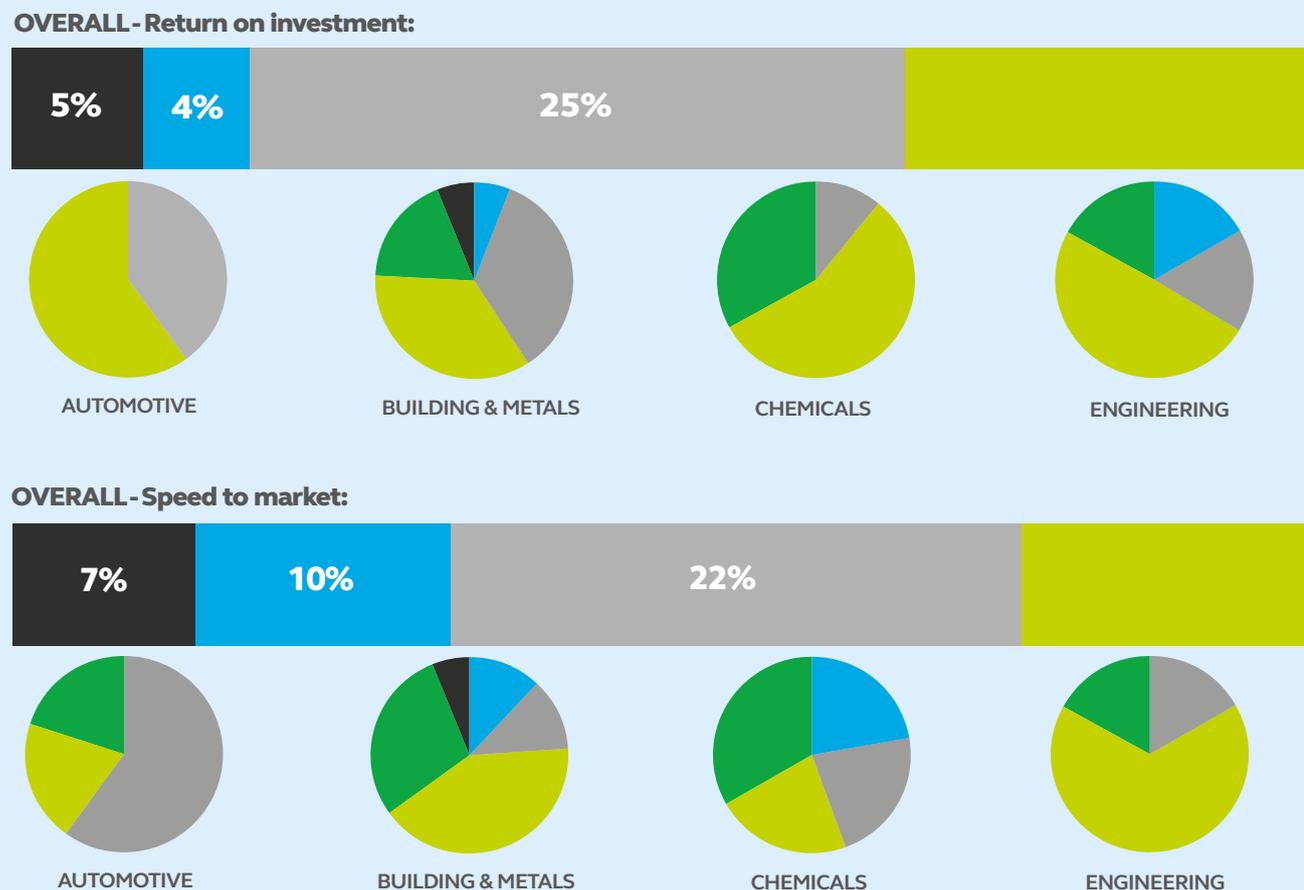
However, no companies in the heavy industrials sector rated their ROI performance as 'good', and a noteworthy 33% of respondents in this sector were unsure of the ROI performance of their built asset portfolios. This may be attributed to high capital intensity, combined with the major influence of commodity prices. Therefore, balancing their ROI with their order processing should be key. The uncertainty

revealed in our research could highlight a need for their operating teams to better report or communicate performance back to the capital program teams in this sector.

When it comes to speed to market, companies are marginally less confident, with 62% rating their asset portfolio performance as 'good'. Performance was particularly low in the pharmaceutical sector, where a mere 29% of companies rated their speed to market as 'good' and nearly half were unsure of their performance in this. This finding is expected given the laser-sharp focus of pharmaceutical companies on speed to market following patent approval, and it is possible that the success criteria for performance is even higher than in other industry sectors. What this does point to, is that an enhanced ability to benchmark performance in this area would be beneficial in this market, and here in particular, asset performance, flexibility and agility is key.

Similarly, being first to market is key for the FMCG sector, in which companies use market research data to identify consumer demand and reach identified markets ahead of competition. Opposite to the pharmaceutical sector, companies in the FMCG sector are performing

Figure 3: Thinking about your portfolio of production, distribution and other facilities, how would you rate your current performance on each of the following?



well at this, with 80% of companies rating their speed to market as 'good' or 'very good'.

With the varying confidence in performance across sectors, how companies and sectors monitor their asset and capital program performance is vital. Nearly three-quarters (70%) of manufacturing companies say they have robust means of measuring the financial benefits of their spending on capital investment projects. Success in this area includes both having an effective means of capturing performance, and a pragmatic way of monetizing the benefits that those programs deliver.

Yet, while a healthy 61% of companies say they identify lessons learned from completed projects, just 54% share those lessons across the business. This failure to share lessons limits the opportunity to find improvements for future capital projects. Consequently, businesses may lose out on cost savings or improved success of future capital projects, deteriorating the business case for future investment. Utilizing benchmarking data from capital investment projects, across both own and sector programs, can greatly improve both cost savings and speed of build. The obvious result is a faster and better ROI as products can be produced and delivered to market quicker.

Furthermore, while two in three companies held central and/or business unit-level benchmarks on their capital investment registers, only one-quarter of respondents'

registers benchmark against other companies in their sector and only one in five benchmark against companies in other sectors. Without benchmarking against industry standards, companies may not be certain that their performance is as competitive as it should be and are unaware of what best practice looks like in the highest performing sectors.

The location assets are built in is also a key factor for ROI. Understanding where facilities are located globally can help inform companies in their decisions; is it better to manufacture outside of the chosen market and ship, or is it better to locate production locally?

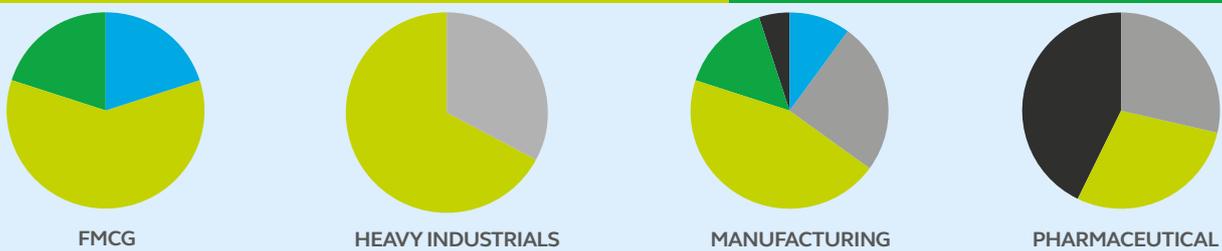
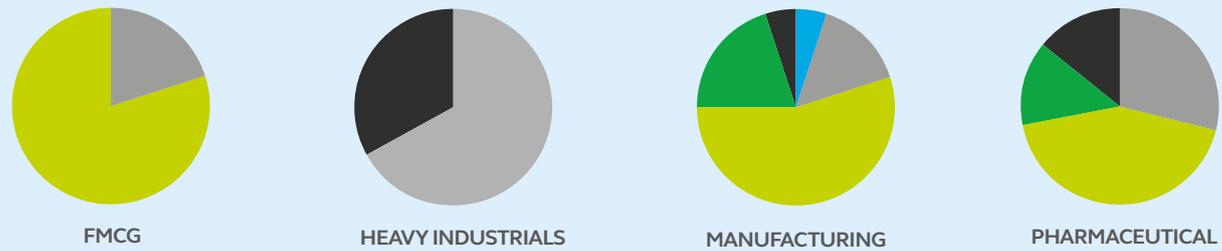
How these decisions are made obviously differs per sector, the automotive, heavy industrial and aerospace sectors, for example, do not necessarily need to be within their consumer market and thus can manufacture where input resources are located, or in lower-cost territories, and ship. Whereas for pharmaceutical or FMCG companies it is essential to have the end-product on the ground and with consumers fast, to lower logistics costs and enhance speed to market.

This is particularly essential for the food and beverage sector, due to the perishable nature of their products. With the dynamic and fundamental changes in manufacturing as a whole, continual review and improvements in these efforts cannot be underestimated.

"The accomplishment of our purpose is [the most significant risk to capital programs]; the return on investment must be successful."

Automotive, Germany

Don't know
 Neither good nor poor
 Fairly poor
 Fairly good
 Very good



Note: Figures are rounded to the nearest whole number

"The most important challenges to capital programs are to reduce security risks, reduce costs and increase speed of project implementation."

Chemicals, Belgium



4.2 FLEXIBILITY AND AGILITY

Chemicals sector ahead in flexibility

The rise of flexible manufacturing has put pressure on built assets to be agile to accommodate production of various products, or small-batch products, such as in the biopharma and specialty chemicals sectors.

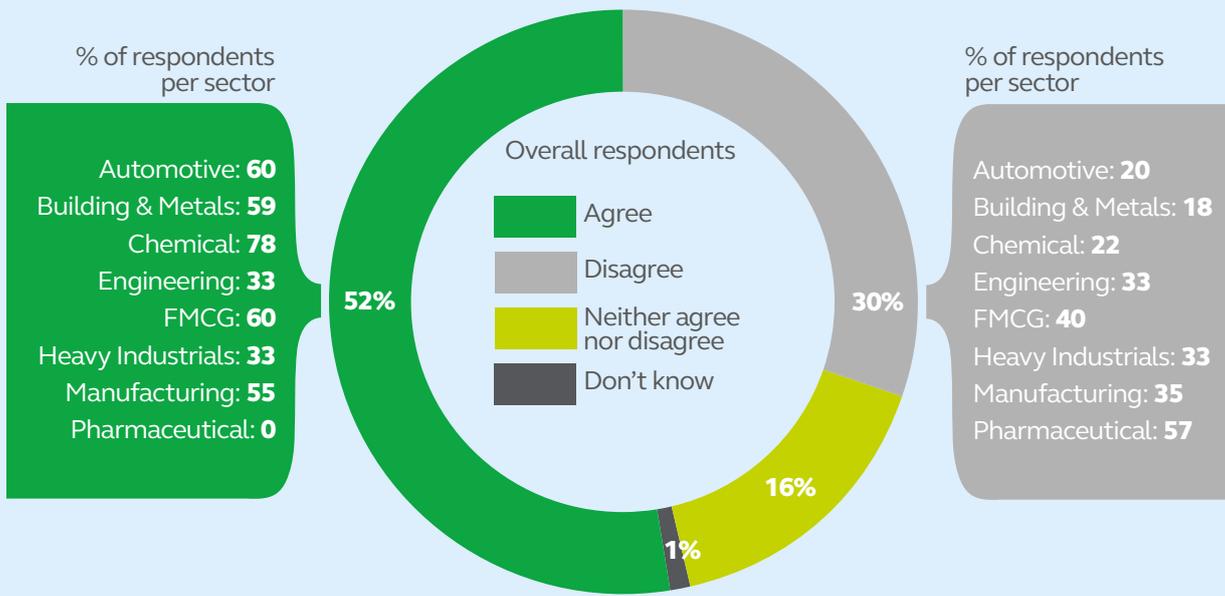
Our findings show that companies in the chemicals sector perceive themselves to be more ready to adapt to change than companies in other sectors. 78% of respondents in the chemicals sector say that their current portfolio of production, distribution and other facilities is flexible enough to meet the challenges facing their business, compared with 52% across all sectors (see Figure 4). This may be because, though chemical companies often take central overall decisions, it is not uncommon in this sector for individual sites to compete for investment from the center. Therefore, there is a need for flexibility to be able to switch product lines to secure board approval for funding and show lower costs in getting product to market. This is unlike sectors such as automotive, where companies are more likely to have a global manufacturing strategy, which allows them to shift product lines around the world.

This flexibility and difference in approach can, however, impact capacity. Some sectors have a tendency to operate for overcapacity, whilst others suffer from not being able to produce sufficient products quickly enough. Having a facility that can adapt to changes in product lines or house more than one product results in cost savings and more sustainable returns. When partnering, particularly with automotive companies, we see how flexible they have made their facilities to help them tackle market demand shifts and there is much that can be learnt from this sector by others.

Given 60% of respondents say that they have a multi-year investment plan in place, it is concerning that 52% are lacking confidence that their built asset portfolios are flexible enough to meet the challenges facing their business. This raises the question of whether their long-term investment plans properly translate - or are bought into - by real estate and production teams. One reason could be that organizations face complex choices as to whether to invest in legacy assets, bringing in modern technology to achieve flexibility or build a new asset that is immediately fit for purpose, which can generate different and sometimes opposing views. What is clear, is that greater connectivity between the real estate and plant and production teams and strategy and corporate functions is essential, and we are seeing that successful organizations treat built assets as a strategic driver for growth, rather than just an essential overhead.

Lower levels of confidence in the flexibility of built assets is also linked to the current pace of change and disruption. Change is seen on the horizon and recognized by companies, however, investment to respond to change is often not available yet. For example, the pharmaceutical sector is anticipating a shift from traditional to biopharma drugs. While they know this change is coming and therefore recognize that any new facilities need to be flexible enough to

Figure 4: Do you agree or disagree that your current portfolio of production, distribution and other facilities is flexible enough to meet the challenges facing your business?



Note: Figures are rounded to the nearest whole number

accommodate future change, the funding may not yet be available to deliver this. This could link to why no pharmaceutical companies agreed that their portfolio is flexible enough.

Additionally, in tech manufacturing, the rise of additive manufacturing is not only changing production methods but also plays a major role in the requirement for flexibility and agility.

The approach to prioritization of the available CapEx is key and we have seen that when this is consistently applied the local CapEx teams improve both planning and business case performance.

While 80% of companies say that their asset longevity performance is 'fairly good' or 'very good', less than a quarter (22%) of companies deploy a 'lifetime usage' of the asset as a performance metric for capital investment projects. Consequently, nearly one in five companies have experienced an early redundancy of an asset. This figure more than doubled to 40% for the automotive sector, likely due to the stringent and changing design standards in this sector. Meanwhile, only 7% of companies in buildings and metals sector had an early redundancy of asset, likely due to greater consistency and certainty in end-product, and less short-term volatility in demand.

Companies - particularly in the automotive sector - could benefit from factoring flexibility of design and longevity metrics into their capital projects and built asset planning, and avoid costly redundancies or repurposing of assets.



4.3 SUSTAINABILITY IN CAPITAL PROGRAMS

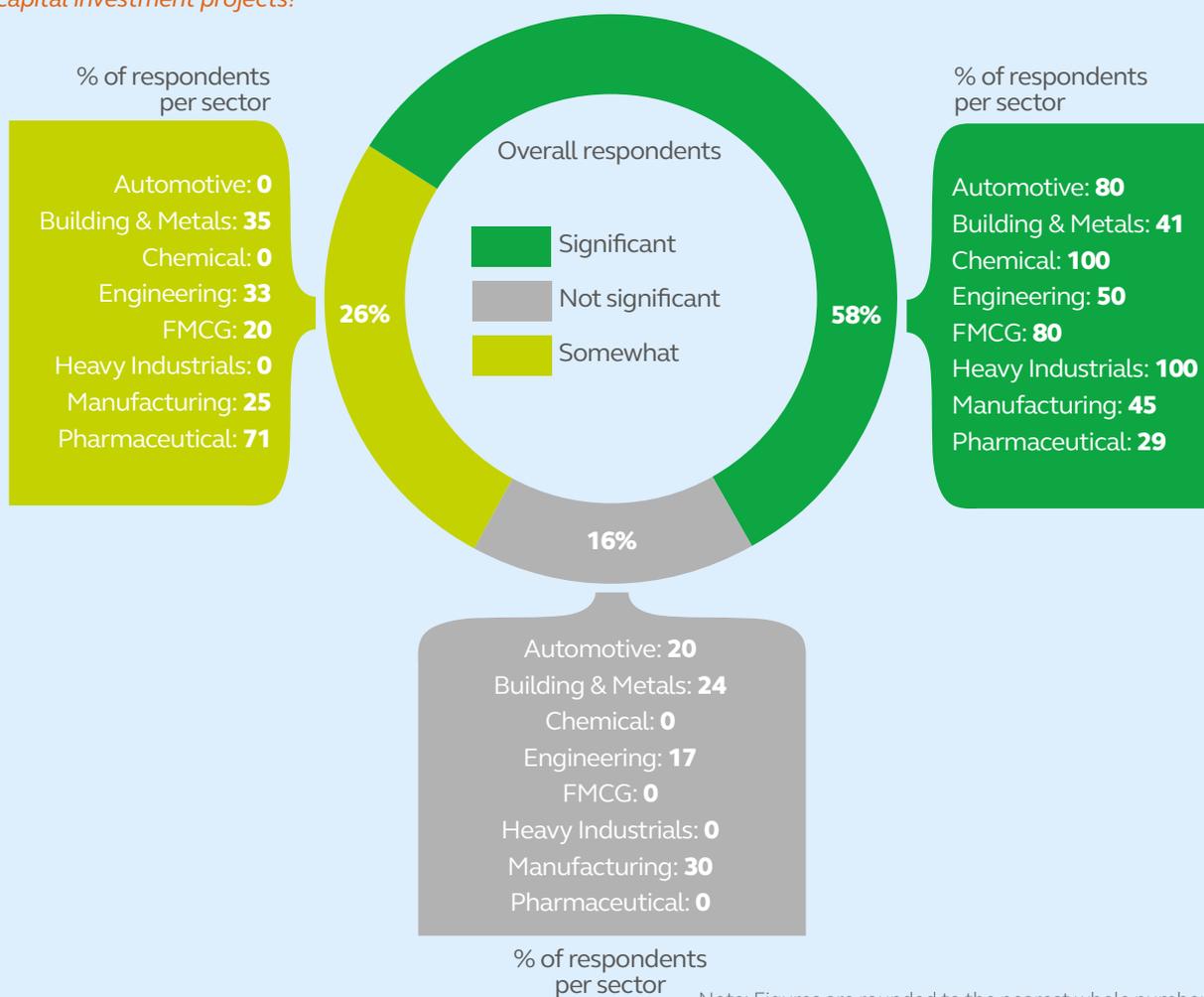
Reducing environmental impact is significant in determining how industrial manufacturing companies approach major capital investment projects, according to six in ten of our respondents (see Figure 5). Unsurprisingly, this was significant for all companies in the chemicals sector, likely due to consumer-facing sectors being more exposed to regulatory and societal pressures. By contrast, less than half of interviewees from the buildings and metals and general manufacturing sectors rated this as significant. Yet for all companies, being able to demonstrate their sustainability credentials is increasingly important in terms of their obligation to their customers, and the communities in which they operate, and in managing their reputation and brand in a market where consumers are increasingly aware and judgmental of corporate social and environmental responsibility. Companies are increasingly facing public scrutiny and pressure to act responsibly.

We observe the tangible progress that has been made in manufacturing sectors in recent years to embrace more sustainable approaches. However, our experience shows that for some companies sustainability remains in tension with commerciality, rather than being complementary. Built assets which use less energy or water not only reduce environmental and social impact, but also reduce operating costs.

Sustainability also includes choosing the right locations for facilities, factoring in proximity to the supply chain, a skilled labor force, access to sustainable energy sources and, vitally, where their customers are located; which may also be more cost-efficient for the business.

Companies must consider all of elements of their social, environmental and economic impact. A long-term commitment to sustainable assets needs to extend to the whole-life impact of capital projects, including asset decommissioning and regeneration.

Figure 5: How significant is reducing environmental impact in determining how you approach major capital investment projects?



"One should not only enter into project-based relationships, but also build long-term relationships."

Automotive,
Germany

"The biggest change [in capital programs] is to be more and better integrated with our providers. It will be done to unify the objectives and processes."

Building &
Metals, Spain



4.4 SUPPLIER INTEGRATION AND COMMUNICATION

More than half (54%) of all respondents have an integrated, enterprise-wide approach to managing supplier relationships, and 52% plan to take a more integrated approach in the next three years. The overall percentage of industrial companies taking this approach with suppliers was brought down significantly by companies in the FMCG sector. This is perhaps because FMCG companies traditionally have transactional relationships with suppliers, in which costs are driven down on individual links and is reflective of using product-related procurement, which typically comes from close locales. However, with integrated supply chains becoming essential for all manufacturing sectors, there is an opportunity for FMCG companies to develop and learn lessons from other sectors when looking to integrate with suppliers, for longer term, more mutually beneficial relationships.

Supporting this trend, those companies that reported using performance metrics with suppliers, briefing suppliers on project objectives and training suppliers on health and safety standards, all reported more confidence in ROI, savings delivered, speed to market, quality of outcomes and longevity of asset performance of built asset portfolios.

Overall, there is room for improvement in manufacturer-supplier alignment. Less than half (48%) share their business goals with their suppliers, and only 57% share their project goals with them (see Figure 6). This can result in an asset that is not suitable for the end-process. This need for improvement is supported by the less than a third (30%) of companies stating that they believe they are 'good at delegating authority to suppliers for them to act effectively on their behalf'. The engineering sector has a particular gap in delegating authority to suppliers, with 50% of companies rating their performance as 'poor' and 17% rating it as 'very poor'. This is likely due to years of transactional relationships with suppliers in this sector, in which squeezing costs have historically caused sub-optimal supply chains, where suppliers are only responsive to orders.

In contrast, our research shows that clients in the automotive industry are generally ahead of other sectors in collaborative behaviors with suppliers, and this sector also favored global supply partners. This is likely due to an industry-wide culture of partnering that has been built over the last 10-15 years, where the benefits of partnering have been widely documented. For example parts that were once made on site by the manufacturer are now produced off-site by suppliers and simply fitted on site, also it is not unusual for automotive companies to even outsource R&D to suppliers.

Integration of suppliers is key to securing the best outcomes for all involved. It takes commitment of time and effort from all parties to make it a success. All have to understand the processes, systems and ways of working and it is imperative to have a cultural connection. This is not only due to the issues of brand protection, but also because a successful partnership relies on all parties having access to the right information and being clear on objectives to secure the best returns and efficiencies. Implementation units can often keep their cards close to their chests and in doing so let suppliers work in the wrong direction when a design change may be needed. As we saw in our 2016 report 'Catalyst for Change', which looked specifically at the chemical and pharmaceutical industries, integrating the supply chain requires a cultural shift within a business and this is a big change for those who are newer to a partnership based model.

A lack of supply chain integration can lead to serious problems. Not sharing business and project goals with suppliers is correlated to one in three companies reporting they had a significant dispute with a supplier within the last two years. It also contributes to the 23% reported failures in capital projects due to issues with their supply chain. This is further evidenced by the lack of disputes reported by companies in the automotive sector, who we have already seen are leading the way in supply chain integration.

Overall, other sectors could learn from the automotive sector in better integrating suppliers into their value chain of getting product to market to avoid disputes and time or cost overruns. In simple terms, successful outcome-oriented companies align their entire supply chains to business goals and to the end-customer; a fundamental characteristic of being 'customer-focused'.

Figure 6: For each of the following, please say whether it applies or does not apply to how your organization manages relationships with suppliers



Note: Figures are rounded to the nearest whole number

4.5 INTERNAL STAKEHOLDER ENGAGEMENT

Just over half (54%) of companies reported that they were good at engaging their internal stakeholders when planning and delivering their capital investment programs, while 39% were unclear about how well they do this (see Figure 7).

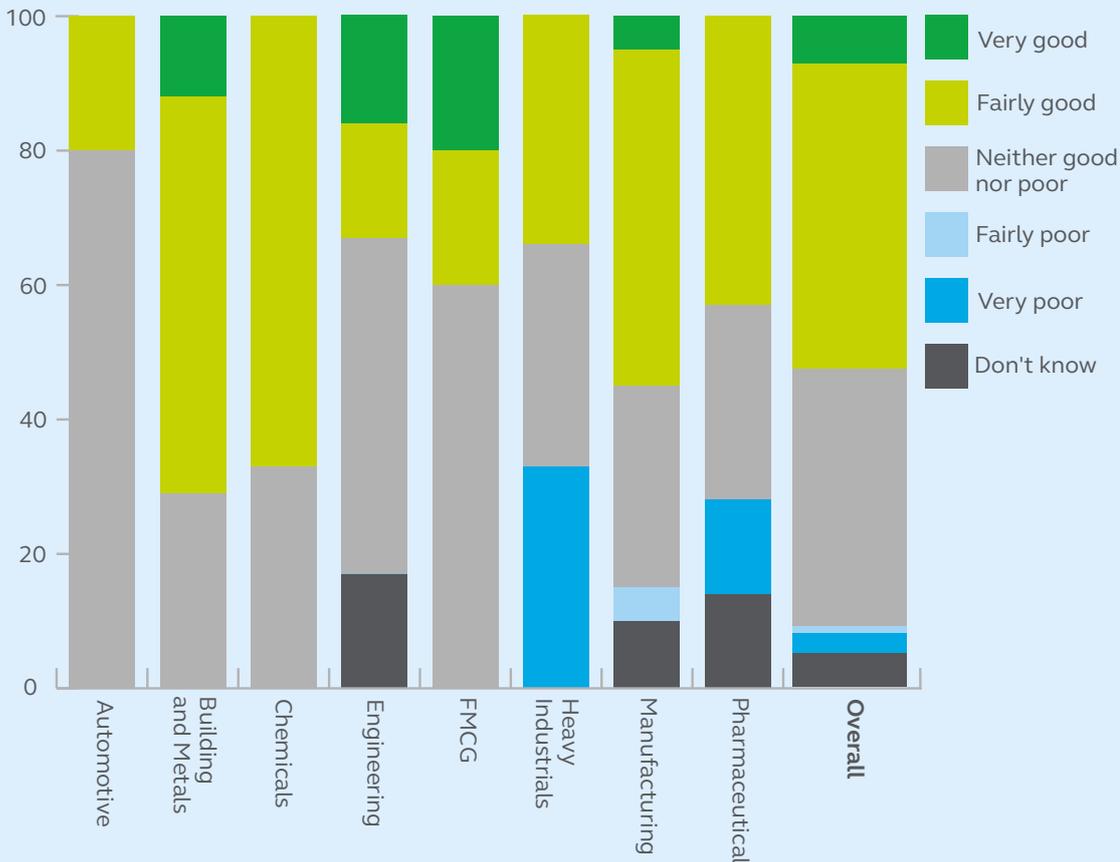
Internal stakeholders can be viewed as the biggest barriers to capital project success – acting as blockers to funds or process. Unsurprisingly, the level of confidence in approach to engaging internal stakeholders significantly correlated with reported confidence that the board views their built asset portfolio as a significant driver of value in their business.

In reality once funding is signed off, those in charge of delivering the capital project can feel remote from the organization. One way to counteract this

is to ensure that those outside of the project remain involved and engagement is maintained throughout, to improve the overall outcome of the project. For example, when building a manufacturing plant housing multiple business units, best practice is to engage representatives from each unit and keep them engaged throughout the project to ensure the resulting asset is fit for purpose and doesn't require a costly redesign.

Failure to engage internal stakeholders reduces support, financing and approval of capital investments for projects, and, at worst, can cause internal stakeholders to block progress or hinder success of capital projects.

Figure 7: How would you rate your current approach to engaging internal stakeholders in planning and delivering capital investment programs?



Note: Figures are rounded to the nearest whole number

"The stakeholders should be involved at an earlier stage and more intensively."

Automotive, Germany

“The biggest change (in delivering capital programs) will be educated stakeholders; we are currently educating all of our stakeholders about their understanding of the global picture, as currently they make many decisions based on the local picture instead of the big picture.”

FMCG, USA

4.6 CENTRALIZATION

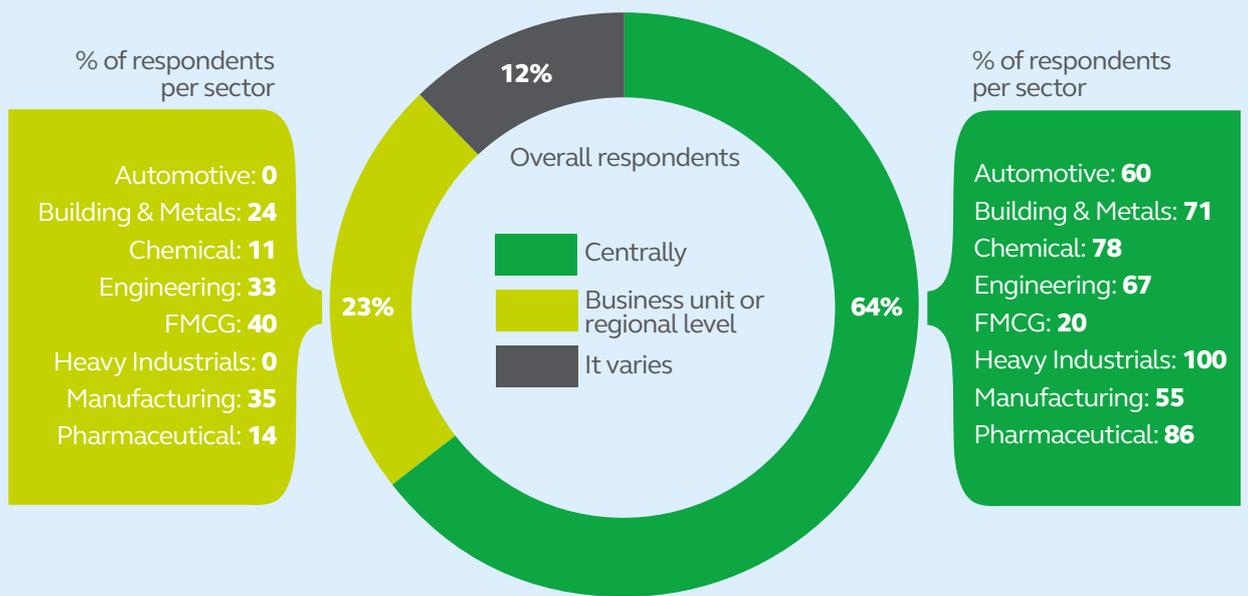
The bigger and more complex the organization, the harder it can be to understand where decision making sits. In some sectors decisions are predominantly made at a global level whereas in others it is split between global and local teams.

More than six in ten (62%) companies across all sectors make decisions about their capital investment projects centrally (see Figure 8). The heavy industrial sector leads the way in this trend, with all respondents from this sector reporting that these decisions are made centrally. This is likely reflective of the highly capital intensive nature of this sector. Meanwhile, FMCG was the sector that did not fully reflect this trend toward centralization, where only one in five companies reported to making decisions on capital investment projects centrally.

Overall, the trend toward centralized decision-making has become embedded in the majority of sectors: 89% of executives say their company has a central enterprise-wide investment board.



Figure 8: What best describes the way your company makes decisions on significant capital investment projects?



Note: Figures are rounded to the nearest whole number

The trend toward this approach is already yielding results; a huge 84% respondents who took decisions centrally reported good performance on savings delivered of built asset portfolios, compared to 71% who took decisions at a business-unit or regional level.

This improved performance is likely supported by the high levels of visibility of capital project and built asset portfolios reported across all sectors – which is key to making informed decisions. Seven in ten respondents also reported that their company has a detailed picture at individual asset level of their production and distribution facilities across the enterprise.

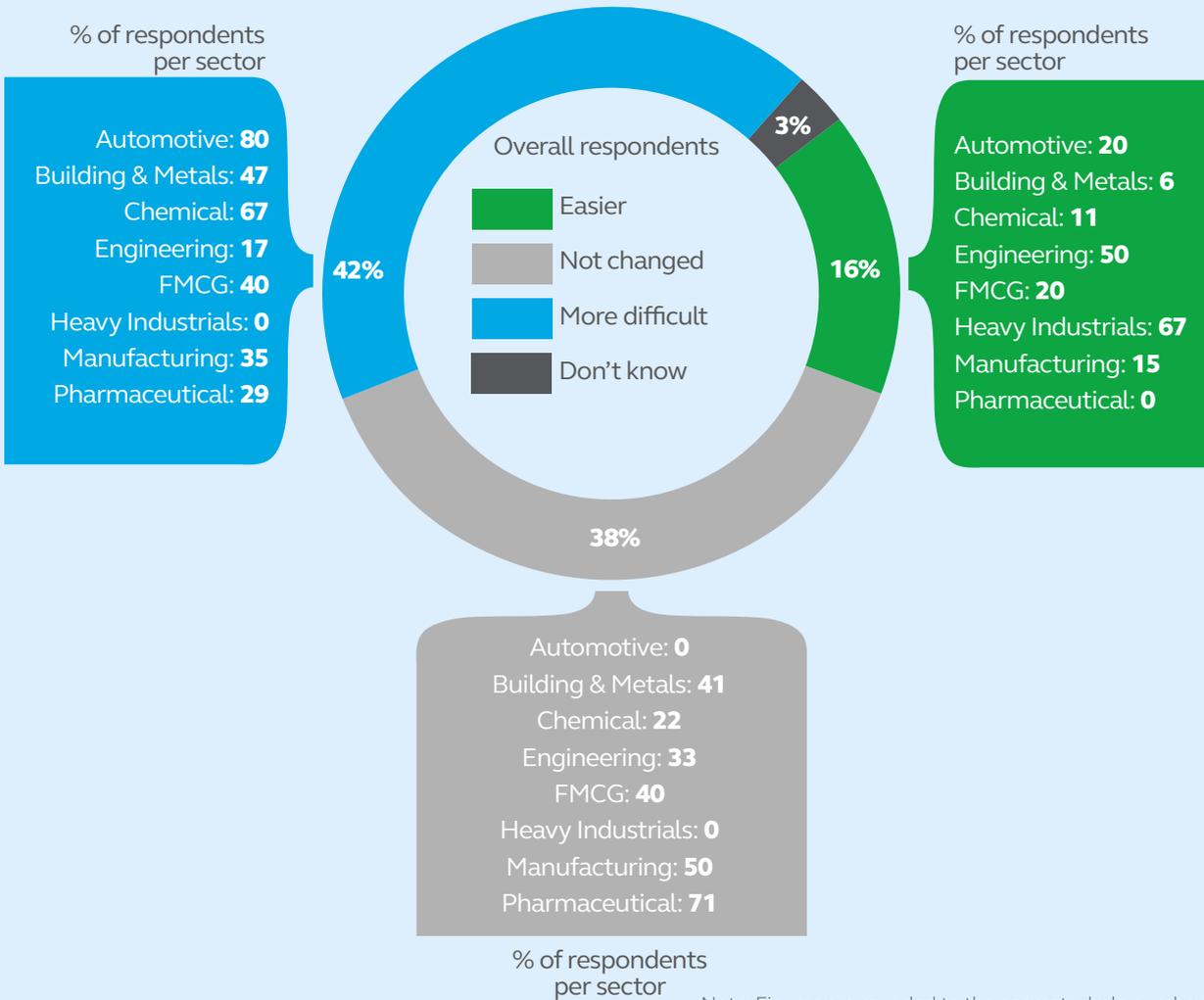
Furthermore, 81% of executives report that they have ‘good’ visibility of all production, distribution and other facilities costs at central, enterprise-wide level.

Clearly, quality decisions require good visibility of the challenge in hand. The paradox is that Industry 4.0 and cyber-physical systems demand decentralized decision making, but our research makes clear that to be successful, capital programs and built asset portfolios require a holistic view.

To maximize the benefits of central decision-making, thorough engagement with business units is essential to secure alignment, understanding and adoption of the decisions reached.

4.7 THE WAR FOR TALENT

Figure 9: Has recruiting and retaining the right people to plan and deliver your capital investment programs become easier, more difficult, or not changed over the past few years?



"A lot of people are retiring, and there is a shortage of young talent in this field"

Chemicals, the Netherlands

"Professional talent is relatively lesser. Young university graduates have higher mobility (which makes it more difficult to recruit and retain talent to deliver capital programs)."

Manufacturing, China

Recruiting quality talent was identified as the second most important challenge for all sectors. 42% of executives reported that finding the right talent had become more difficult over the past three years, while 29% say it remains unchanged (see Figure 9).

Crucially, more than half (56%) of respondents say it is 'difficult' to recruit and retain the right people to plan and deliver capital investment programs; for more than one in ten, it is 'very difficult'. The automotive and FMCG sectors report being particularly challenged in recruiting talent for their capital delivery projects.

Manufacturing companies not only need to invest in their built assets to create appealing workplaces that attract the talent they require, but they also need skilled, specialist workforces to deliver and operate these built assets.

One issue, particularly in automotive, is that the type of talent required is changing. As we have seen, there is now a need for those involved in capital projects to understand new approaches including technologies and supply chain management. As a result companies may need to consider recruiting from areas other than their traditional routes.

For many sectors, sector-specific experience is a pre-requisite when finding the right talent for capital delivery, particularly when delivering manufacturing facilities as processes need to be understood to house them correctly. With an aging talent pool for delivering capital programs who are looking to retire, and a lack of younger talent entering the industry, this issue is becoming ever more relevant.

With the supply chain facing the same constraints on talent, integration becomes even more important for all parties because, as good-quality talent becomes scarcer, all will face increased salary costs and failure to attract the best recruits will leave projects susceptible to delays and, in extreme cases, failed capital projects.

5. SEVEN STEPS - THE ROUTE TO SUCCESS

Drawing on the expertise and knowledge from Arcadis' Industrial and Program Management experts, and the insights shared by the interview participants, we have outlined a seven-step solution for manufacturers:

STEP 1: Monitor and improve performance through industry benchmarking and performance management

As companies embrace a more centralized approach to capital delivery, access to accurate, consistent performance data becomes ever more important. Putting the right lead and lag performance indicators in place, and tracking and reporting these correctly is the basis of a more responsive, proactive capital delivery function. Utilizing industry benchmarking, construction analytics and cost profiling tools help to create a performance culture and drive down costs.

Additionally, Capital Delivery Leaders must be wary of optimism bias which many Project Managers inherently hold. Implementing a more evidence-based approach to risk management and business cases, and choosing management styles with risk management at the core can help reduce project time and cost overruns, and

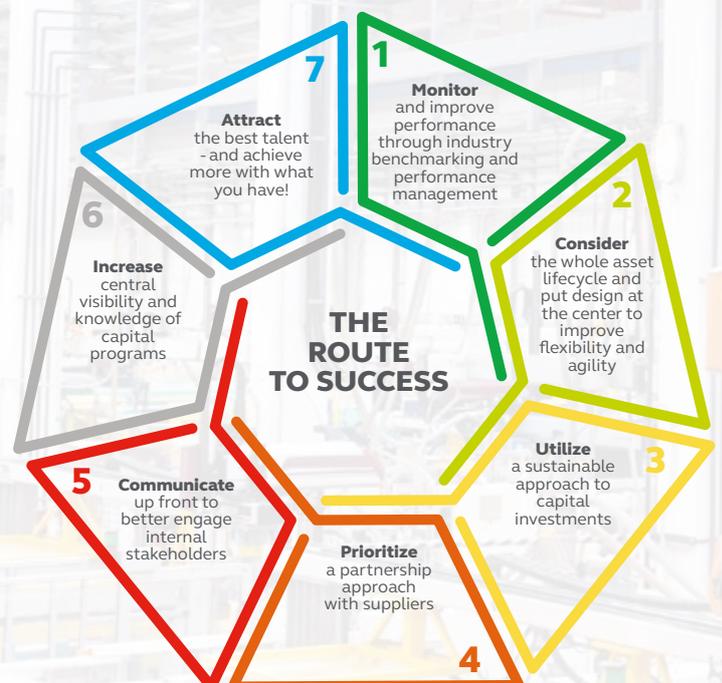
ensure companies are prepared for emerging risks across their portfolios.

STEP 2: Consider the whole asset lifecycle and put design at the center to improve flexibility and agility

When planning built asset capital programs, companies need to consider the whole asset lifecycle – from conception to repurposing, right through to decommissioning.

Embedding flexibility at the heart of built asset design can lengthen asset life-cycles and reduce costs when the inevitable re-purposing occurs.

Companies that map out the future, making use of probability-based decision support tools, can greatly improve decision making, mitigate risks to obsolesce or abortive costs.



Technologies like BIM support this approach by providing information on the lifecycle of the assets. Working backwards during the design process, BIM allows asset owners to start optimizing their assets from the very beginning, while securing the availability and reliability of the asset information during the lifecycle for further optimization during operations.

Additionally, using total cost of ownership tools can best demonstrate long term risks and liabilities.

STEP 3: Utilize a sustainable approach to capital investments

Sustainability of capital investments not only speaks to the built assets themselves but to the impact they pose to the environment and community in which they reside. Manufacturers will face continued regulatory and societal pressures as they advance further into new geographies, following their supply chain, labor force, and markets. When investing, companies should conduct robust Environmental and Social Impacts Assessments (ESIA) of their investments, to enhance stakeholder engagement and secure an overall 'social license to operate'.

By incorporating energy and environmental design standards with a focus on material selection, performance-based approach to indoor environmental quality, smart grid thinking and water efficiency, when designing, constructing, maintaining, operating and planning for a facility's eventual decommissioning, manufacturers can responsibly address and mitigate regulatory and societal pressures while also lowering costs.

Companies can go a step further in achieving a sustainable approach to capital programs. Taking the time up front to strategically assess long-term impacts of their CapEx decisions, including when selecting single or multiple sites, can maximize the benefit, social acceptance and ROI in the long-run.

STEP 4: Prioritize a partnership approach with suppliers

Integrating suppliers into the core business value chain and aligning them to delivering product to a market does not happen by chance. The real value of enhancing the supply chain means replacing ad hoc approaches with a partnership focus, helping suppliers gain a deep understanding of business needs and objectives. Shifting focus to incentivize on outcomes, rather than outputs is a start, and we find that key performance indicators for the supply chain are more successful for suppliers wholly aligned to the capital delivery program team. New technologies also require a partnership approach. Commitment from both capital delivery program team and suppliers is needed to secure seamless information exchanges and optimize usage of new technologies.

However, companies must invest in continually improving supplier engagement, innovation and communication to align them to business goals. This critical client role requires dedicated attention and investment without which capital delivery performance falls short of expectation.

STEP 5: Communicate up front to better engage internal stakeholders

Internal stakeholder management can make or break a capital program, so early and sustained engagement is crucial. Effective stakeholder engagement requires involvement of the capital function at the earliest stages of business planning for new facilities.

The ability to support optioneering and financial planning with expert support from the supply chain is key to this early engagement. This is likely to involve risk based "should cost" and "should take" benchmarking and access to new technologies, like Virtual and Augmented reality, which allow non-experts to understand the planned facility and contribute with their knowledge about production processes to optimize performance during operations. Organizations that work out how to introduce such expert advice early in the process will benefit through increased certainty in delivery and beyond. Building customer relationship management is a core competency for capital delivery organizations and this culture of engagement needs to begin during recruitment and then be encouraged and developed through out peoples' careers.

STEP 6: Increase central visibility and knowledge of capital programs

Where companies have taken a centralized approach to decision making, it is necessary that they have the right visibility and knowledge of their capital project and built asset portfolios. In this way, they can ensure that their centralized capital programs take into account every part of their business, and that it properly translates to their real estate teams.

Companies looking to achieve this promote a culture of visibility through successful monitoring and registering of their assets and capital programs – supported by real-time digital platforms. This transparency includes the attributes for prioritizing investments, whether regulatory and safety, improving business performance, or other facets. This can be supported by leveraging internal and supplier CapEx data and analytics.

STEP 7: Attract the best talent - and achieve more with what you have!

When delivering capital programs, the right talent is crucial, and can inevitably be costly. Attracting top talent is made easier by having a reputation as a progressive and continuously improving capital delivery organization. Being thoughtful with the design of roles, and contracts, is also important when seeking to attract the best. It can also be the case that the best experience is found in supplier organizations where career development and learning curves can be faster, further supporting the move to outsource delivery roles.

Once you have the team in place it is about leveraging technology to simplify processes and maximize the effectiveness and efficiency of the talent available, ultimately enabling capable people to do more. Organizations that invest in career paths, capability development and capability assurance programs, both with suppliers as well as their own staff, will benefit greatly over the long term.

The digitization agenda itself will require new skills and knowledge. Capital delivery functions can look to external providers to access these fast evolving skills, rather than focusing on scaling up with an increased internal headcount, which takes internal capacity away from core business.



6. CONCLUSION

Our research presents a positive picture for industrial CapEx overall. The industrial sectors are evidencing a relatively mature approach to capital programs, taking a future-focused and integrated view of their built asset investments, in the context of delivering their products to market.

This is mirrored in their overall confidence in the performance and outcomes of their capital projects. It has substantially shifted from what has been previously witnessed in the industrial sectors, where capital projects were historically planned and executed on a fragmented or site-by-site basis.

However, in a changing and price-constrained market, companies cannot afford to fall behind their competition or will lose out on sales and end-user loyalty. The seven key research trends and themes highlight clear areas for improvement in capital planning and delivery in the industrial sectors. As industrial change and innovations come in quicker succession, companies must ensure they are in the leading percentiles of their sector to remain competitive, and industrial sectors must learn from the insights revealed to ensure they are ready for the future.

Progressive companies are embracing technology to visualize and share information with all suppliers and stakeholders, while also securing asset information. And it is recognized that the decentralized interactions that characterize Industry 4.0 are enabled by high-quality, centralized visibility of performance and decision-making. Consequently, while embracing technology is

key, the real value lies within building close relationships and engagement with these stakeholders and suppliers. Committing effort to engaging their business partners throughout the planning, design and construction process can help manufacturers achieve an integrated value chain, where all parties are focused on getting the most innovative and competitive product to market.

This agile, data rich, high engagement style of capital delivery is what consumer demands are now driving, and many industrial manufacturers are well on their way to achieving it. While this is a positive picture for the leading companies, it is imperative that less mature companies follow this trend and learn from their peers to successfully invest and build in changing manufacturing markets.

Want to know how you benchmark against your peers?

In addition to our research, Arcadis works with leading capital delivery organizations to assess and optimize investment planning and delivery. If you are interested in finding out how you benchmark against your peers, please contact us.



7. METHODOLOGY

Ipsos MORI conducted 73 structured telephone interviews, on behalf of Arcadis, between 16th August and 30th September 2016.

Participants were responsible for significant management decisions about capital investment projects for their business.

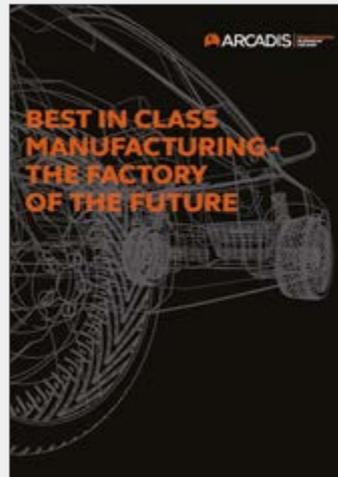
Together, the participants represent leading manufacturing companies generating over US\$300 billion in revenues each year, spanning the automotive, pharmaceutical, chemical, building and metal, heavy industrial, fast moving consumer goods (FMCG - including food and beverage) electrical, engineering and general manufacturing sectors.

Participants were from the UK, Continental Europe, North America, Latin America and Asia. The geographical scope of their role was primarily country-specific, global or region-specific.

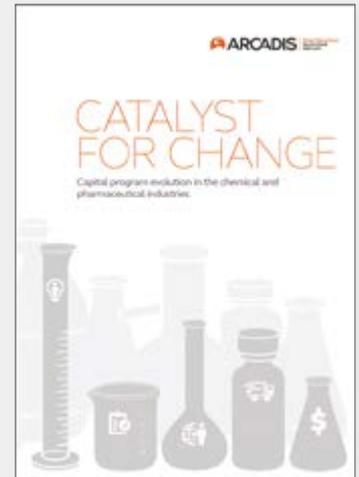
This report was created by Brian Riddick, together with insights from Arcadis' Global Sector Leaders and our expert key contributors Tom Morgan and Edel Christie.



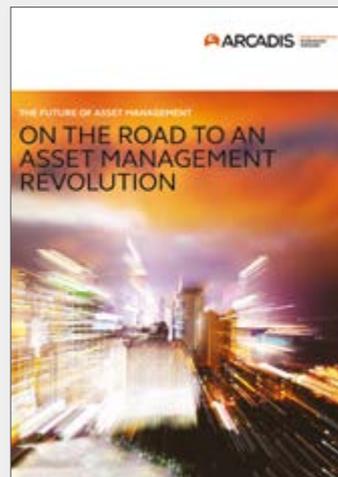
8. FURTHER READING



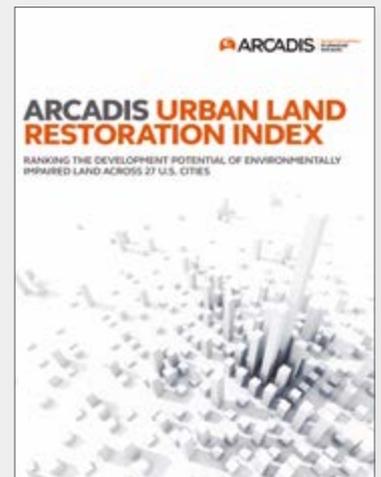
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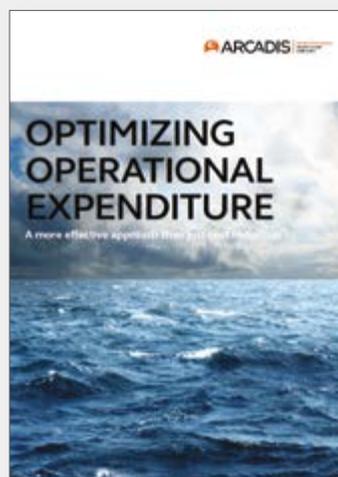
CATALYST FOR CHANGE: CAPITAL PROGRAM EVOLUTION IN THE CHEMICAL AND PHARMACEUTICAL INDUSTRIES



ON THE ROAD TO AN ASSET MANAGEMENT REVOLUTION



ARCADIS URBAN LAND RESTORATION INDEX - HARNESSING THE VALUE OF INDUSTRIAL SURPLUS PROPERTY



OPTIMIZING OPERATIONAL EXPENDITURE

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