AECOM

Middle East Handbook

Property and Construction Handbook 2015 Edition

FOREWORD

Welcome to the ninth edition of the Middle East Construction Handbook. We hope that you find this year's selection of articles, references and cost data of value.

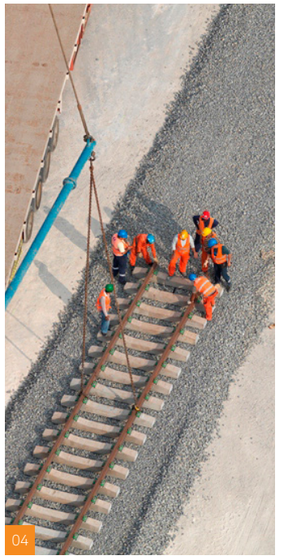
This year we conducted our second Middle East Construction Survey. The survey provided insight into the current and future shape of the construction industry as expressed by industry stakeholders in the region. Overall, despite heightened business uncertainty amid the continuation of geopolitical risks and low oil prices, the construction industry remains cautiously positive about its prospects. Long-term infrastructure spending commitments and event-driven investment were cited among the main reasons that the industry will continue its growth path and avoid another boom-bust-cycle. However, despite this optimism, the risks of a renewed slowdown have certainly increased over the past year. Oil prices are an overriding concern for industry stakeholders, impacting on government sectors and sentiment in private sector alike.

Our articles section starts with a look at design trends in mixed-use developments, as we see developers looking to differentiate their developments in order to create sustainable communities and in turn diversify their income channels and manage investment risks. In line with sustainable mixed-use developments, our second article looks at Capital Reserve Funds as a proactive management tool required to maintain the competitiveness of assets as they progress through their lifecycle.

We continue our articles section by providing a framework for successful implementation of Building Information Modeling (BIM) at a project and business level. As our 2015 industry survey shows, the Middle East construction industry still has some way to go before it can fully realize the benefits of BIM. We wrap up our articles section by providing an overview of our cost knowledge management system (Global Unite and GUIDE). Initially, Global Unite was intended to provide streamlined processes for accessing benchmark data internally. However, the creation of GUIDE enabled AECOM to present this information to clients in informal and formal meetings either via the tablet or via the web application in formal presentations.

We conclude with our reference section, our international and regional cost data and a brief overview of our Middle East Construction Survey.

As with previous years we continue to seek feedback to support our drive for improvement in everything we do. Please contact the authors — Hamed Madani, Maren Baldauf-Cunnington and Jowhara Al Harazi — via bi_middleeast@aecom.com for further information and to take part in the 2016 Middle East Construction Survey.



01. Yas Mall, Abu Dhabi, U.A.E.
02. DAMAC Heights, Dubai, U.A.E.
03. King Khalid Medical City, Dammam, K.S.A
04. Etihad Rail Phase One, Abu Dhabi, U.A.E.

CONTENTS

Middle East Handbook 2015
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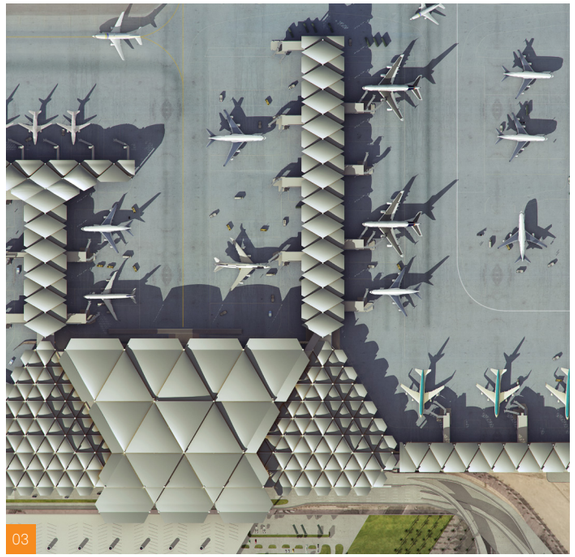
01


02


03


04


05


06

01. Al Bahr Towers, Abu Dhabi, U.A.E.
02. Al Khail Road, Dubai, U.A.E.
03. King Khalid International Airport, Riyadh, K.S.A.
04. Hamad Port, Qatar
05. Riyadh Metro, K.S.A.
06. Al Ain Water Distribution Center, Al Ain, U.A.E.

AECOM Middle East

In a complex and unpredictable world, where growing demands have to be met with finite resources, AECOM brings experience gained from improving quality of life in hundreds of places.

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For nearly 60 years, we have been working in the Middle East to create a better tomorrow. We understand cities — how they work, how they grow, and how they thrive across the built, social, economic and natural environments they comprise. We draw on our fully-integrated planning, design engineering and architecture, construction and management capabilities to help make the region's cities world class.

For nearly 60 years, we have been working in the Middle East to create a better tomorrow.

Section

ONE

Economic Round Up

AECOM provides construction management for the Midfield Terminal Complex in Abu Dhabi, U.A.E.

Middle East Construction Review

AECOM MIDDLE EAST CONSTRUCTION SURVEY

In 2015, we conducted our second Middle East Construction Survey with the aim to assess the state of the regional construction industry, to examine the drivers and barriers currently at play, and to reflect on concerns expressed by our client organizations and other industry stakeholders. The survey findings have informed our review of the Middle East construction industry as outlined in this section.

Overall, despite heightened business uncertainty amid the continuation of geopolitical risks and low oil prices impacting the region, the construction industry remains positive about its prospects, with a maturing sector, long-term infrastructure spending commitments and event-driven investment cited among the main reasons that the industry will continue its growth path and avoid another boom-bust-cycle. However, despite this optimism, the risks of a renewed slowdown have certainly increased over the past year. Oil prices are an overriding concern for industry stakeholders, impacting on government sectors and sentiment in the private sector alike. Against this backdrop, the construction industry will be monitoring the market to judge:

- Whether the sentiment-driven upturn in construction awards seen in 2014 will be sustained this year and next in the face of increased uncertainty.
- Whether the recent moderation in tender price inflation reflects a dip in sentiment over future workload or lower materials input costs.
- How the fall in oil prices will, in the medium and long term, impact local governments and private sector investors' appetites for construction projects.

INDUSTRY PERFORMANCE

The industry across the region grew solidly up until the second half of 2014, when the sharp drop in oil price, political succession in K.S.A. and heightened geopolitical tensions put a damper on aggressive expansion and investment plans.

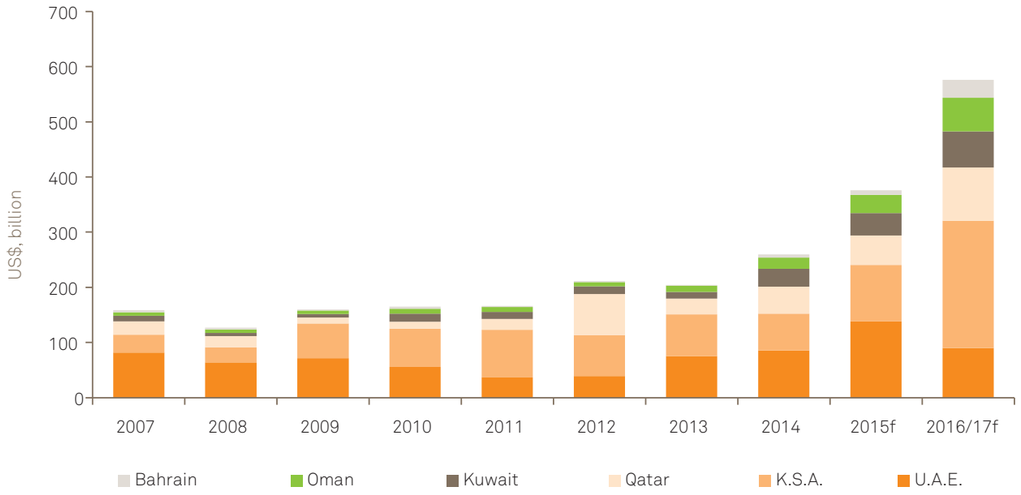
With the exception of K.S.A., project awards in 2014 increased notably across the region according to data from MEED. In particular, after a disappointing performance in recent years, project awards in Bahrain and Kuwait increased significantly, and also rose strongly in Oman and Qatar. In the U.A.E., project awards totaled nearly US$86 billion, the highest figure in MEED's records. In contrast, the flow of project awards slowed in K.S.A., attributed to the change in government in the past year.

However, as oil prices fell sharply in the second half of 2014, sentiment dipped and a number of projects were put on hold or were cancelled, due in parts to revisiting of budgets and project scopes. In the U.A.E. alone, projects worth US$64 billion were shelved or put on hold in the second quarter of 2014, while in K.S.A. and Qatar projects put on hold were valued at US$21 billion and US$13.5 billion, respectively.

Our findings from the AECOM 2015 Middle East Construction Survey confirm that the buoyant optimism of last year waned, as nervousness about budget reviews amid persistent lower oil prices impacted on the flow of projects. Some 57 percent of those surveyed saw industry workload expand over the past 12 months, compared to 86 percent who reported stronger construction expansion in the preceding year.

FIGURE 1. MIDDLE EAST PROJECT AWARDS + CURRENT PIPELINE

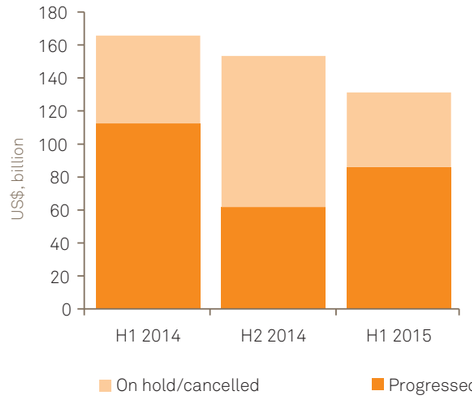
As at June 2015



Source: MEED

FIGURE 2. MIDDLE EAST PROJECTS PROGRESSED AND ON HOLD/CANCELLED

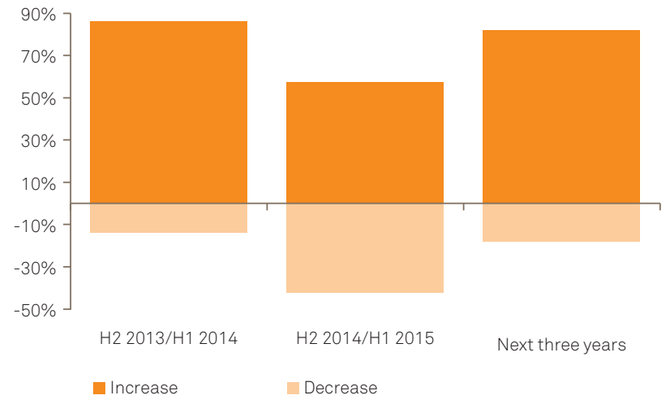
As of June 2015



Source: MEED

FIGURE 3. CONSTRUCTION GROWTH

58 percent of respondents reported an increase in construction workload over the past 12 months



Source: AECOM 2015 Middle East Construction Survey

In particular, our survey participants noted that in K.S.A. the market is seeing a number of unfinished projects, budget reviews, slow flow of projects amid change in government, revised budget forecasts and re-evaluation of key projects. In contrast, in the U.A.E. and Qatar, event-driven (Expo 2020 Dubai and 2022 FIFA World Cup Qatar) and high-profile projects such as the Hamad Port are still driving project work with political commitment in place to deliver these projects.

The respondents to our survey believe that their organization outperformed the wider industry over the past 12 months, with nearly three-quarters saying that their organization's workload increased. This was mainly due to ongoing committed projects in infrastructure, tourism, and event-driven projects. Companies indicated that aggressive pursuit of strategic work, increased bidding for work in particular for public projects, and the pursuit of large-scale opportunities that suit certain contractors and consultants able to deliver an integrated offer enabled them to capture an increased market share of available work.

Overall, the construction industry remains positive about its prospects, with a maturing sector, long-term infrastructure spending commitments.

OPTIMISTIC VIEWS ON GROWTH

Despite more uncertain trading conditions, the vast majority of respondents to our survey are optimistic over future growth, in the industry as a whole and their company's prospects.

However 'certainty' over industry and organization prospects decreased compared to the survey findings of last year, due to an apparent increase in projects being shelved or put on hold over the past few months. Indeed, while half of respondents indicate that they are 'certain' about their organization's prospects, two-thirds are divided in their opinion whether their anticipated growth projection will materialize over the next three years. Respondents are even more uncertain about industry prospects, with just one-fifth viewing industry workload expectations as 'certain', while more than one third appear to be 'uncertain', a marked jump from last year's survey, when the response was overwhelmingly 'certain'.

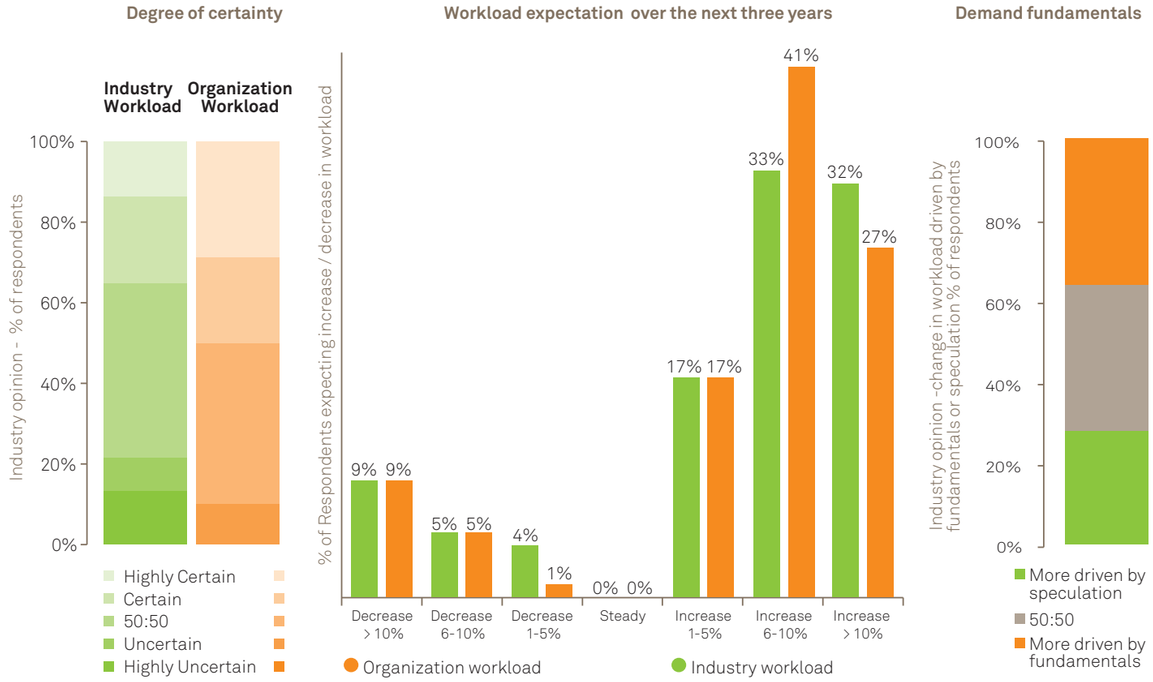
Consensus remains around workload expectations surrounding Expo 2020 Dubai and associated transport, i.e. aviation, metro links, as well as tourism-related projects.

While a small majority of industry players are optimistic to achieve revenue growth well above the sector average, uncertainty around prospects may impact strategic plans and investment decisions. Those that expect strong workload growth for their companies over the next three years cite a wider service offering and strategic push in key sectors as their main strength to outperform within a more uncertain business environment. Some also report that it is their large-scale projects won and underway that will allow for steady revenue growth over the next years. Reputation is also cited as a key strength, as clients are increasingly selective in choosing partners for their investments/developments.

The most positive responses continue to come from businesses in the U.A.E. and Oman, while those in other countries are more doubtful about industry prospects. Such findings are largely consistent with the trading conditions in these countries. In the U.A.E., consensus remains around workload expectations surrounding Expo 2020 Dubai and associated transport, i.e. aviation, metro links, as well as tourism-related projects. In contrast, uncertainty has increased in the real estate sector over the past year, where buoyant demand, especially in the residential sector, has waned this year amid more subdued demand levels and expectations of a price correction.

In Qatar workload expectations continue to center around preparations associated with the 2022 FIFA World Cup Qatar and associated infrastructure investments, though doubts remain over project viability and a process of review to achieve lower capital cost for projects continues. In Saudi Arabia, political succession appears to have caused a hiatus in the flow of projects, which was widely expected by the industry. Nevertheless, the industry remains optimistic that commitment to resume large-scale investment plans remains in place and that several large-scale transport, social infrastructure and industrial projects that have been delayed will finally be executed.

FIGURE 4. WORKLOAD EXPECTATIONS AND RISKS TO OUTLOOK



Source: AECOM 2015 Middle East Construction Survey

GROWTH AREAS

No doubt, uncertainty over the business environment and availability of finance for projects has increased over the past 12 months, which has caused a reassessment of many schemes. However, the long-term fundamental drivers for construction demand across the region remain in place, which together with global events-driven projects should support the projects market in the region. Economic growth, urbanization and population increases will continue to place pressure on housing, water, electricity, transport and social infrastructure, and the region's populations will look to their governments to deliver on commitments.

Transport is by far the most dominant sector, with many high-profile airport, metro and rail projects being undertaken. According to MEED, there are US$270 billion worth of projects in the current award pipeline. More than three-quarters of those surveyed said that they expect the strongest industry growth in rail, road, and airport-related work, an opinion shared by those expecting their companies growth to be driven by transport-related work.

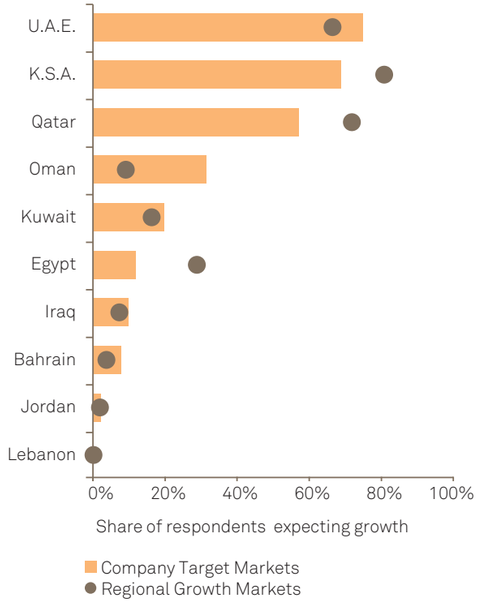
Construction firms are still heavily dependent upon governments' infrastructure plans for future growth, with a third of respondents citing public works as a target sector, though just over a quarter expect this sector to expand over the next three years. Such reliance amid potential public belt tightening could mean diminishing work from a vital source of new projects. Hospitality and cultural-related work is a priority sector for a third of those surveyed and over two-thirds expect this sector to expand in over the next three years, driven mainly by works related to the Expo 2020 Dubai, which has spurred interest not only in directly-related works, but also in retail, hospitality, theme parks and other attraction-related projects.

On the back of a strong performance in 2014, the U.A.E. is now seen as the most attractive country in which to invest in the region, with three-quarters of those surveyed viewing the U.A.E. as their priority market. In contrast, K.S.A. and Qatar have lost some of their attraction, due in parts to the slower flow of projects. Dwarfing all infrastructure projects in the U.A.E. is the Al Maktoum International Airport expansion, currently budgeted at US$32 billion according to MEED, which when built will accommodate more than 200 million passengers a year. There are also large-scale mixed-use developments in the pipeline, the most prominent of which is the Dubai Holding and Emaar Properties Dubai Creek Harbor currently budgeted at US$17.7 billion and planned to be developed over a 30-year horizon.

MEED estimates that 350 projects worth US$92 billion (excluding those 'in study') could be awarded in Qatar between 2015 and 2017, the largest of which is associated with QRail's Passenger and Freight Rail worth US$10 billion in total. K.S.A. also has a large project pipeline, according to MEED, with 321 projects worth US$70 billion expected to be awarded between 2015 and 2017. This excludes projects that are in the study phase. There are large-scale transport projects, i.e. Jeddah Metro, Mecca Metro and massive mixed-use developments, i.e. Riyadh Land and Military Medical City in Riyadh, which will take years to be executed. However, when and how these projects will be awarded is yet to be determined by project owners and developers. Oman is increasingly seen as a target market, with 30 percent of those surveyed viewing market prospects as very positive, up from just over a tenth last year. Improvements in the recent track record of project awards and large-scale investment plans around strategic economic zones, such as Duqm Port, have helped to increase interest in the Sultanate's construction industry. The largest project in pre-execution phase is the Oman National Railway, which will be executed in nine segments and is planned to be completed by 2022. Segment one, worth US$1.075 billion is currently in contract bid phase.

FIGURE 5. GROWTH MARKETS

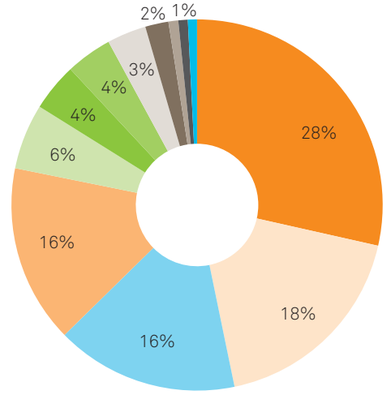
Industry perception of growth markets and companies' focus regions



Source: AECOM 2015 Middle East Construction Survey

FIGURE 6. GROWTH EXPECTATIONS AND COMPANY PRIORITIES

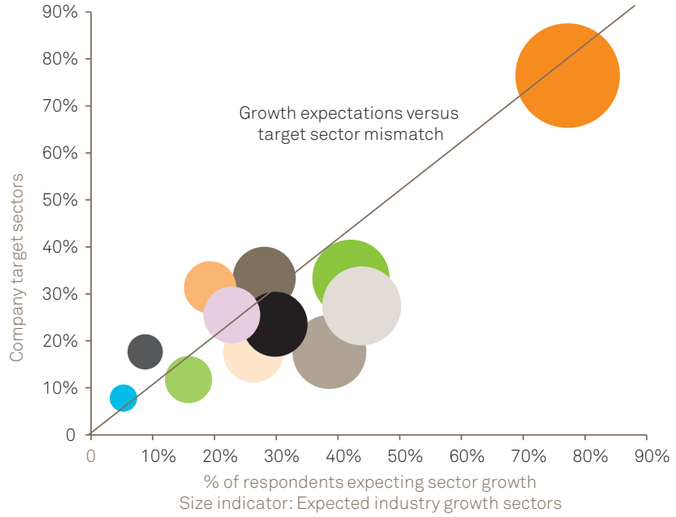
Expected Project Awards 2015-17
GCC, Progressed projects only
Total value: US$ 951.7 billion



- Transport
- Oil + Gas
- Chemical
- Industrial
- Public
- Retail
- Residential + Mixed Use
- Energy + Utilities
- Cultural, Leisure, Hospitality
- Healthcare
- Education
- Commercial

Source: MEED, as at June 2015

Industry Growth Expectations Versus Company Target Sectors



- Commercial Offices
- Education
- Retail
- Public (civil and defense)
- Transport (road, rail, aviation, ports)
- Sport and Leisure
- Hospitality and Cultural
- Healthcare
- Residential
- Industrial
- Energy + Utilities (oil, gas, water)
- Mixed Use

Source: AECOM 2015 Middle East Construction Survey

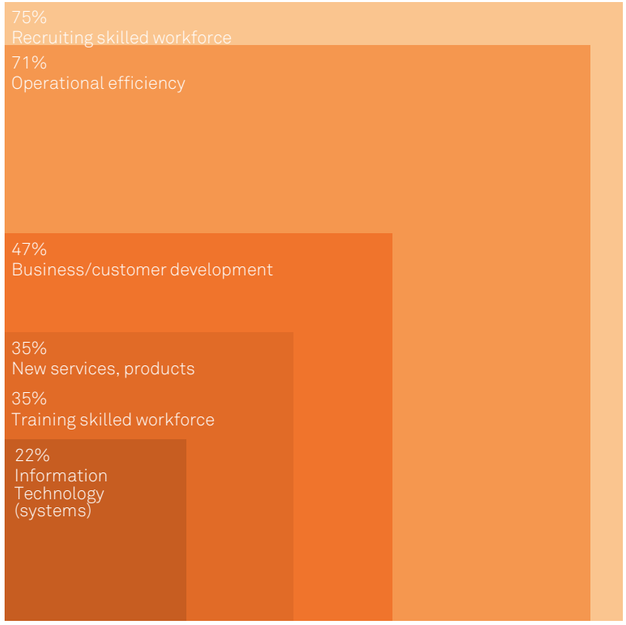
GROWTH STRATEGIES AND INVESTMENT PRIORITIES

Reflecting increased business uncertainty and expected slower industry growth, a smaller share of respondents (56 percent) than last year (71 percent) expect company growth to come primarily through organic routes. In contrast the share of those looking at mergers and acquisitions to fuel expansion has risen compared to last year.

More than a quarter of respondents also see alliances and joint ventures as a way to tap into growth sectors, in particular those where large-scale construction programs are expected to go ahead. Recruiting a skilled workforce and operational efficiency remain the main investment priorities for companies in order to meet expectations of industry expansion. Other priority investment areas are business and customer development, as well as new services and products offerings together with IT.

Recruiting a skilled workforce and operational efficiency remain the main investment priorities for companies in order to meet expectations of industry expansion.

FIGURE 7. COMPANY INVESTMENT PRIORITIES TO ACHIEVE GROWTH



Source: AECOM 2015 Middle East Construction Survey

MARKET PRICING

Across the region, tender prices increased modestly over the past year, driven by increased confidence and the psychology of pricing on the back of higher work volumes. However, variations by market remain and overall the pricing environment is still very competitive and client organizations continue to press for the best possible prices.

Experienced contractors able to deliver large-scale, complex projects can still demand higher prices, as fewer, but larger projects are currently being awarded to established contractors with a delivery track record. Such contractors have been able to pick and choose projects and the pricing of tender components, such as overheads and profits, have become firmer for some of these projects. Generally however, low commodity prices mean that clients are reluctant to accept higher project costs. Indeed, there is anecdotal evidence that clients are seeking to renegotiate project costs amid budget reviews.

Our 2015 survey shows the majority of survey participants believe the industry currently has a 'balanced' capacity when it comes to labor, plant and equipment, and materials. This may be one factor driving the moderate rate of construction inflation. Regional variations do exist both between and within countries, and large-scale projects, in particular those in remote locations, may face higher construction costs mainly as they require experienced contractors able to deal with the scale of the projects. The sharp drop off in commodities markets has certainly impacted investors and project owner's sentiment, increasing the construction industry's uncertainty over future workload.

FIGURE 8. CAPACITY IN BUILDING INDUSTRY

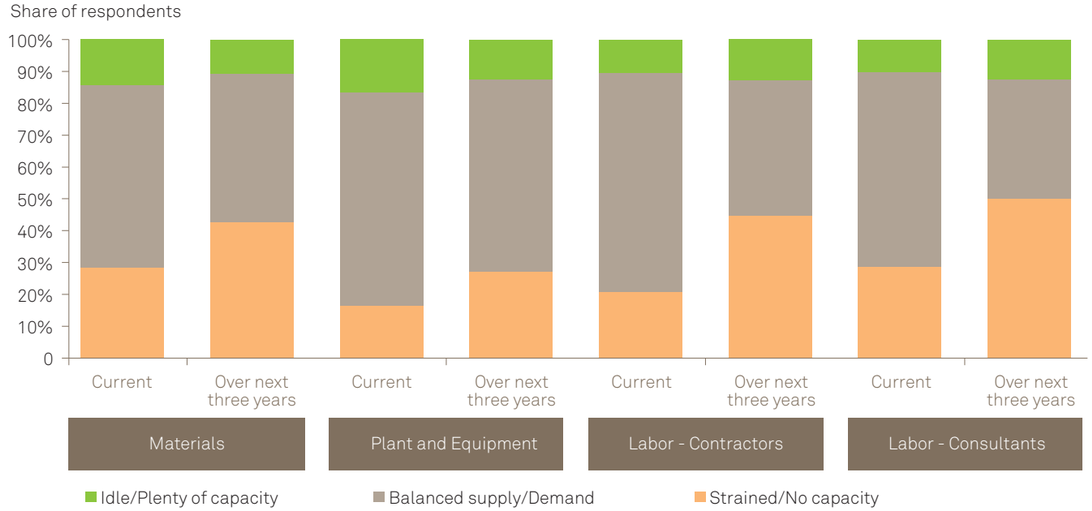
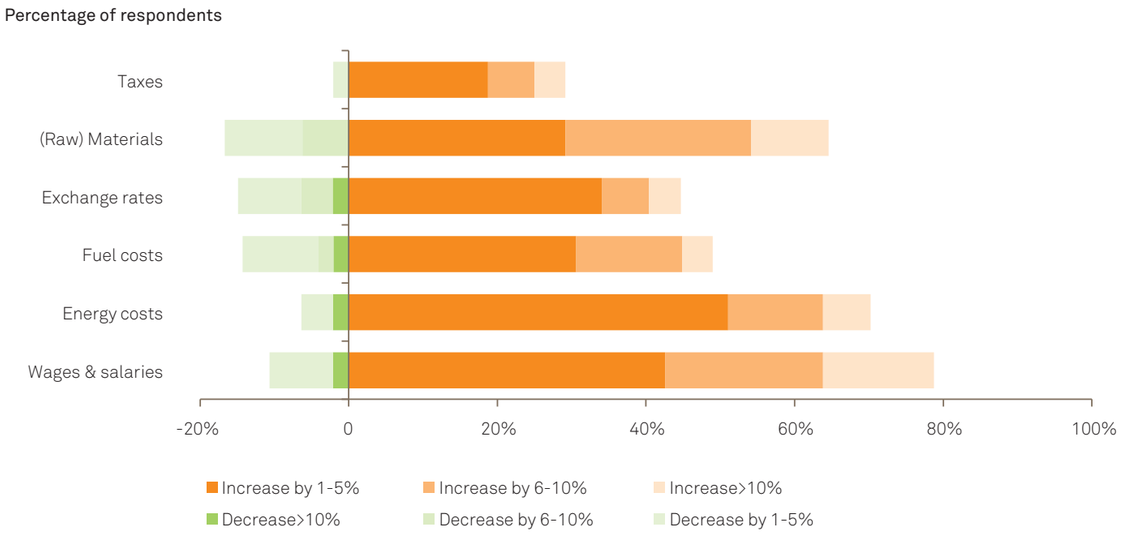


FIGURE 9. EXPECTED CHANGE IN COSTS OVER THE NEXT THREE YEARS



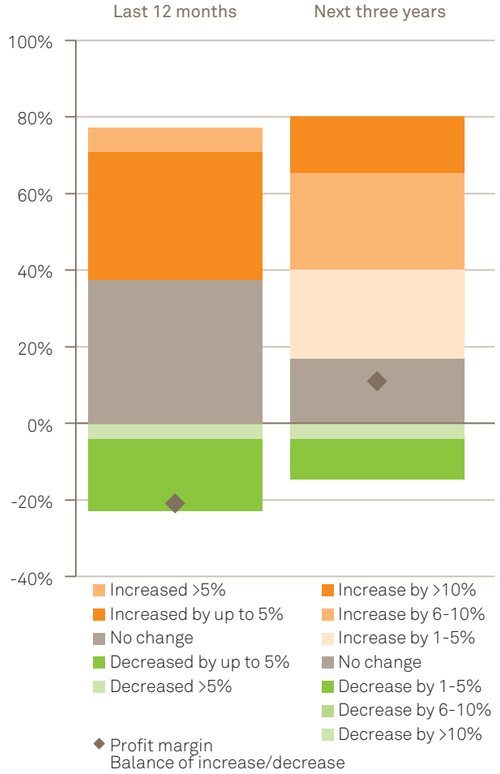
Our industry survey shows that input cost inflation in the region continues to be driven by wages and salaries. Concerns have been voiced in Saudi Arabia, where the construction industry continues to be impacted by the introduction of the Nitaqat system, which has led to a reduction in the use of expatriate labor. This appears to still disrupt workflow on top of a slower pace of project awards by owners. Pressures from energy and fuel costs have decreased significantly over the past year, in line with a decrease in oil, commodities and raw material costs.

The current workload and the award pipeline are generally supportive of further tender price increases, moderated by sharply lower prices for commodities and some building materials. Looking ahead, nearly two-thirds of survey participants expect construction tender prices to rise over the next three years. This compares to more than 90 percent of survey participants who expected a rise in our survey last year.

The drop reflects the uncertainty around project awards and expectations of a period of subdued or no input cost inflation. Clients will remain cautious in the current business climate and are likely to pressure the construction supply chain into accepting reduced capital costs.

Regional variations will persist and more active locations, such as Dubai, may see higher tender price inflation in particular if large projects currently in the pipeline are awarded over the coming years, such as the Al Maktoum Airport Expansion and the Dubai Creek Harbor. This will certainly increase competition over labor, material and plant, give renewed impetus to tender price inflation. These projects will also be delivered by the most capable contractors and supplier base and these organizations are likely to achieve higher margins. Increased activity coupled with lack of capacity in some local markets such as Oman is also expected to lead to higher tender prices inflation.

FIGURE 10. TENDER PRICES AND PROFIT MARGINS



Source: AECOM 2015 Middle East Construction Survey

Concerns have been voiced in Saudi Arabia, where the construction industry continues to be impacted by the introduction of the Nitaqat system, which has led to a reduction in the use of expatriate labor.

CHALLENGES AND RISKS

Of all the potential barriers to progress, the biggest concern currently is the sharp drop in oil prices and the potential impact lower government revenue will have on the flow of project awards in the region.

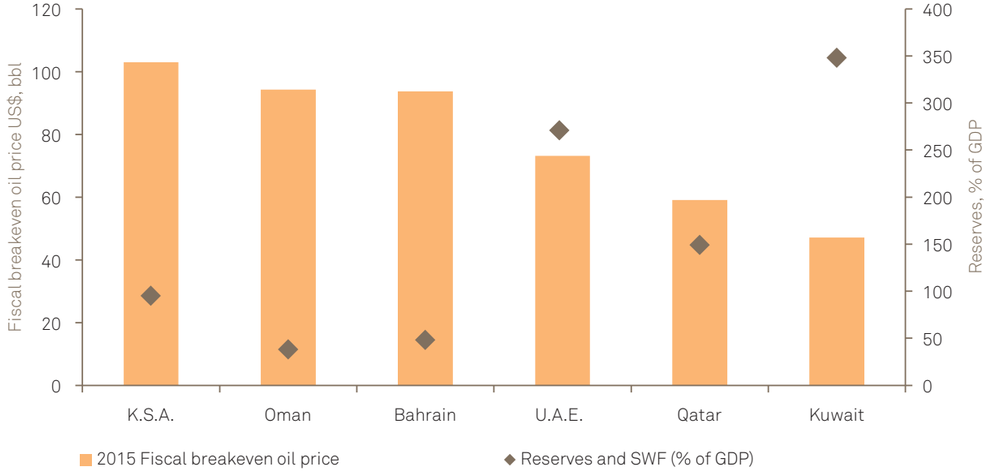
A large proportion of the Middle East construction sector remains heavily reliant on public sector work, in particular outside the U.A.E. Concern over budget reviews has not only slowed the flow of public sector projects, but also hit private sector sentiment. Political continuity in the context of geopolitical risks, resource availability, project delivery, and bureaucracy and regulation are also seen as major challenges to the regional industry.

Impact of oil prices on project funding and delivery

The sharp drop in oil prices over the past year has hit the largely positive economic sentiment across the region and increased uncertainty over the future of project spending. While the general perception is that the GCC economies as a whole are too wealthy to be derailed by the oil price slump, government budgets need to brace themselves for a shift from abundance to shortfall. Low oil prices are decreasing the reserve cushions of governments, which are likely to over time limit the fiscal expansion seen over the past decade.

FIGURE 11. FISCAL BREAKEVEN OIL PRICE AND RESERVES

Oman and Bahrain are seen as most vulnerbale to low oil prices, but many of the other countries' sovereign wealth fund investments may be in illiquid assets and not accessible immediately.



Source: IMF

This is likely to impact on policies and could impact the region's economies and the construction sector in a number of ways, as public spending is still the GCC's most powerful economic tool, determining and impacting on:

- Direct government capital spending
- Indirect spending — projects sponsored by state or executed by semi-government entities with finance made available due to guarantees it is perceived to offer
- Close link between oil prices and private sector sentiment, reflected in private sector spending, investment and access to foreign capital
- Direct impact on liquidity and availability of credit.

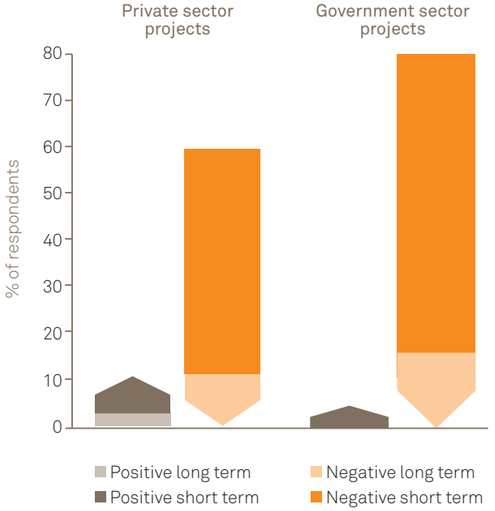
How sensitive the region will prove to be depends on where oil prices settle. In our survey we asked industry experts about their opinion on the short-term and long-term impact of lower oil prices on construction projects, both public and private schemes.

Unsurprisingly, the vast majority expects the impact to be negative, though expectations are that the main impact will be felt in the short-term, rather than over the longer term. In particular, the drop in oil prices has hit sentiment and led to almost immediate public budget reviews, with projects being reconsidered, especially those that are seen as non-essential. Similarly, private sector owners are also reviewing their schemes, in particular those where projects require funding and commitment to public expenditure on associated infrastructure. Anecdotal evidence suggests that a number of non-critical, luxury developments have been put back for the foreseeable future across the region.

As governments adjust to a new reality of lower oil prices and budget adjustments have taken place, expectations are that projects will start to go ahead again. A number of survey respondents expect government and private sector project owners to start renegotiating project prices, which, if successful, is likely to lead to lower margins for contractors and the supply chain. Lower construction prices on the back of decreased commodity and material prices is also one of the reasons why some survey participants felt that lower oil prices might be beneficial to the construction industry, as project owners may be enticed to press ahead with schemes to capitalize on favorable project pricing.

Now more than ever, given the social tensions in the region, governments are under pressure to deliver the promises they have committed to in terms of investments in social and economic infrastructure to provide their populations with adequate housing and job opportunities, in parts to maintain social cohesion. Furthermore, the completion dates of the event-driven investments taking place in Qatar (2022 FIFA World Cup Qatar) and the U.A.E. (Expo 2020 Dubai) cannot change and projects associated with these, including projects in infrastructure and hospitality, should go ahead.

FIGURE 12. IMPACT OF LOWER OIL PRICES ON CONSTRUCTION PROJECTS



Source: AECOM 2015 Middle East Construction Survey

Project finance solutions

Public-financed projects continue to dominate the region's project market, as the region largely remains in early stage of evolution in terms of financing large projects. Diversification of project funding has been long on the cards within the region, an issue that is becoming more pressing given lower public budgets. Countries are likely to be impacted differently by lower public funding availability, depending on the depth of their reserves, willingness to run a budget deficit and the share of the public sector in the market.

Alternative financing options are being explored to increase private finance participation, including various public-private partnership models, export credit agency guarantees, Islamic Finance structures, government guarantees, multilateral financing, and raising funds at capital markets via construction financing, bridging loans, bonds, etc. Attracting these funds may prove difficult as investors will be reluctant to invest in a more uncertain market. Apart from general market conditions, risk-averse private and institutional funders require a high level of confidence in a project and its owners, as well as firm contractual arrangements, a condition not always met in the region.

Indeed, in contrast to last year's survey, a smaller number of those surveyed expect project finance to come from local banks and private funds over the next years, which may be a reflection of private sector uncertainty. Many banks in the region that have pre-financial crisis loans on long-term projects are yet to return to the market and funding remains available only to a select number of traditional projects, such as the utilities (energy and water) sector. Export Credit Agencies (ECAs) — project financing backed by host countries — are a finance route that have actually increased in recent years and has become a critical source of finance in some sectors, in particular transport and infrastructure. Asian ECAs have been particularly active in the market.

Overall, while some progress is being made and the market is starting to develop solutions for long-term funding solutions, evidence of alternatively financed deals remains patchy and more needs to be done to convince the investor community of the project owner's ability to proceed with these projects.

FIGURE 13. PROJECT FINANCE

Current source of project finance and expected trends over next three years

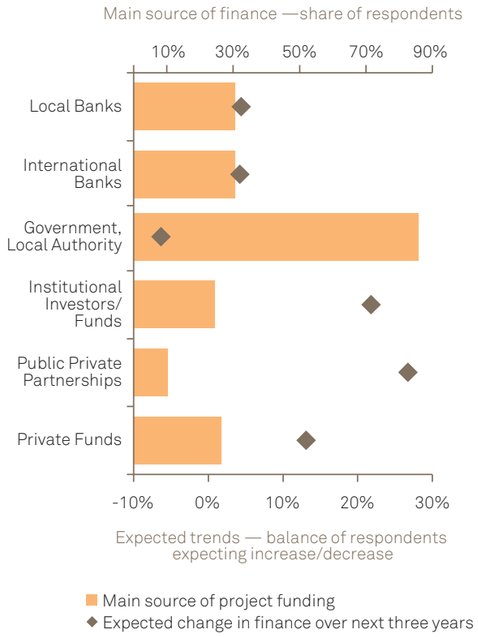
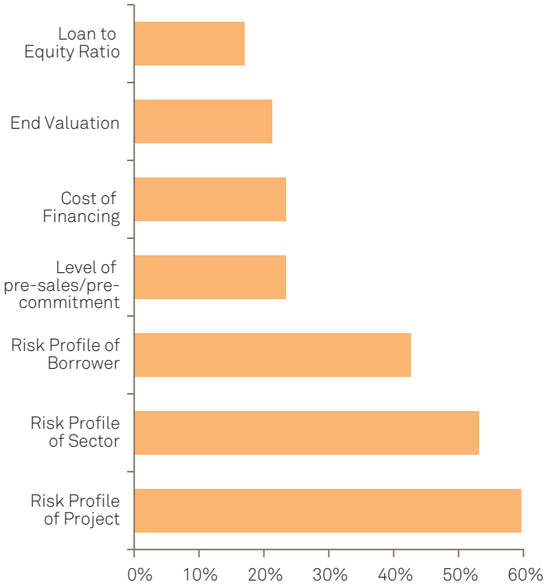


FIGURE 14. BARRIERS TO PROJECT FINANCE

The risk profile of the project and the sector are the greatest barriers to project finance



Source: AECOM 2015 Middle East Construction Survey

Capacity and project pricing

While expectations for tender price inflation have decreased compared to a year ago, prospects of a number of mega projects being led in the near future could still put parts of the supply chain under capacity constraints. Uncertainty in the business environment will make the industry reluctant to invest in capacity before any major project commitments have been firmly made and contracts are in place. This issue is magnified in smaller markets where the availability of skills and key materials might be smaller or more limited. Securing new work at an appropriate margin is the focus for the industry supply chain, but given the current climate this commercial target may become increasingly difficult to meet, in particular as competition increases for fewer projects.

The market is starting to develop solutions for long-term funding solutions, evidence of alternatively financed deals remains patchy and more needs to be done to convince the investor community of the project owner's ability to proceed with these projects.

Country Statistics

The table and figures below provide a summary of key macroeconomic statistics

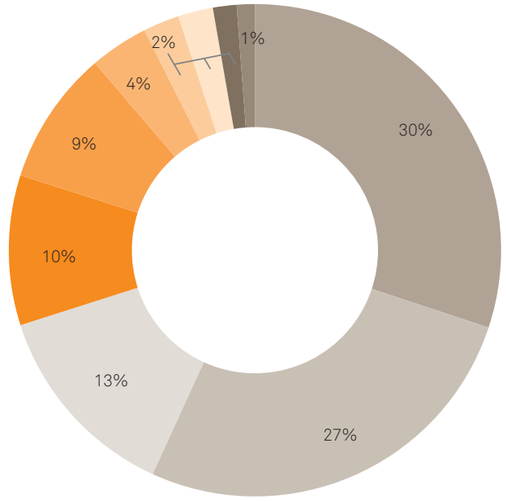
Statistics 2014

	Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Oman	Qatar	Saudi Arabia	U.A.E.
Land Area, km2 (1)	0.8	995.5	434.3	88.8	17.8	10.2	309.5	11.6	2,149.7	83.6
Capital City	Manama	Cairo	Baghdad	Amman	Kuwait	Beirut	Muscat	Doha	Riyadh	Abu Dhabi
Population, million (2)	1.2	86.7	35.9	6.7	4.0	4.5	4.1	2.2	30.8	9.3
Population Growth, CAGR 2009-13 (%) (2)	2.0	2.4	3.2	2.2	2.8	1.0	9.1	8.1	2.8	3.0
GDP, US$, billion, current (2)	33.9	286.4	221.1	35.8	172.0	49.9	77.8	210.0	752.5	401.6
Real GDP Growth, % (2)	4.7	2.2	-2.4	3.1	1.3	2.0	2.9	6.1	3.6	3.6
Real GDP growth, 2014-2019 pa forecast (2)	2.7	4.6	6.9	4.4	2.7	3.2	2.4	6.0	3.1	3.6
GDP/Capita (PPP), US$ (2)	51,714	10,877	14,571	11,927	71,020	17,986	39,681	143,427	52,183	64,479
Construction Output, share in GDP (%) (4)	6.3	4.7	8.0*	4.5	1.9	6.2	4.5*	5.6	5.4	9.0
Value of Construction Output, US$ billion	2.1	13.3	17.9*	1.6	3.2	3.1	5.2*	11.9	40.6	36.0
Project Awards, US$ billion (3)	5.7	N/A	26.3	5.8	32.4	1.5	20.2	49.7	64.8	86.3
Consumer Price Inflation, %	2.5	10.1	2.2	2.9	2.9	1.9	1.0	3.0	2.7	2.3

All data are 2014 data unless otherwise stated
(1) Source: World Bank
(2) Source: IMF
(3) Source: MEED, Budget value of construction contract awards
(4) Value of Construction Output based on National Accounts
(*) Estimate only (based on 2013 official data)

FIGURE 15. SHARE IN REGIONAL CONSTRUCTION MARKET

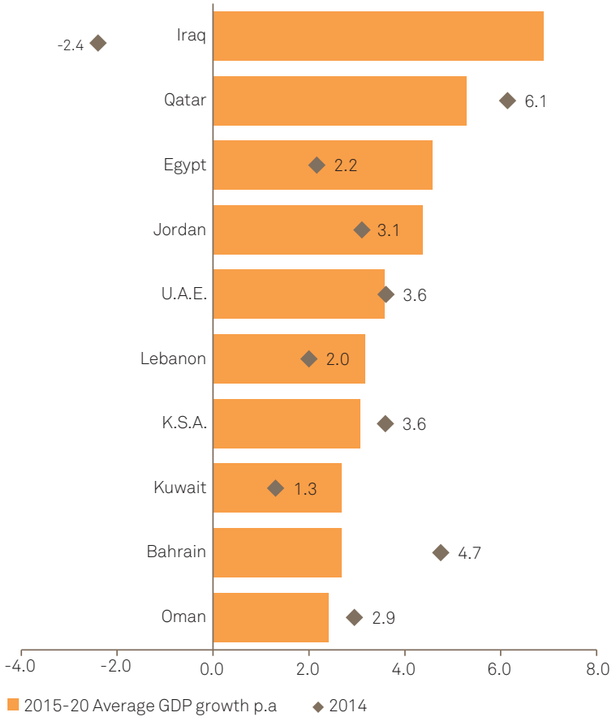
Based on 2014 construction output



Total regional construction output in 2014
based on National Accounts US$ 135 billion

FIGURE 16. MIDDLE EAST ECONOMIC GROWTH FORECAST

Annual %

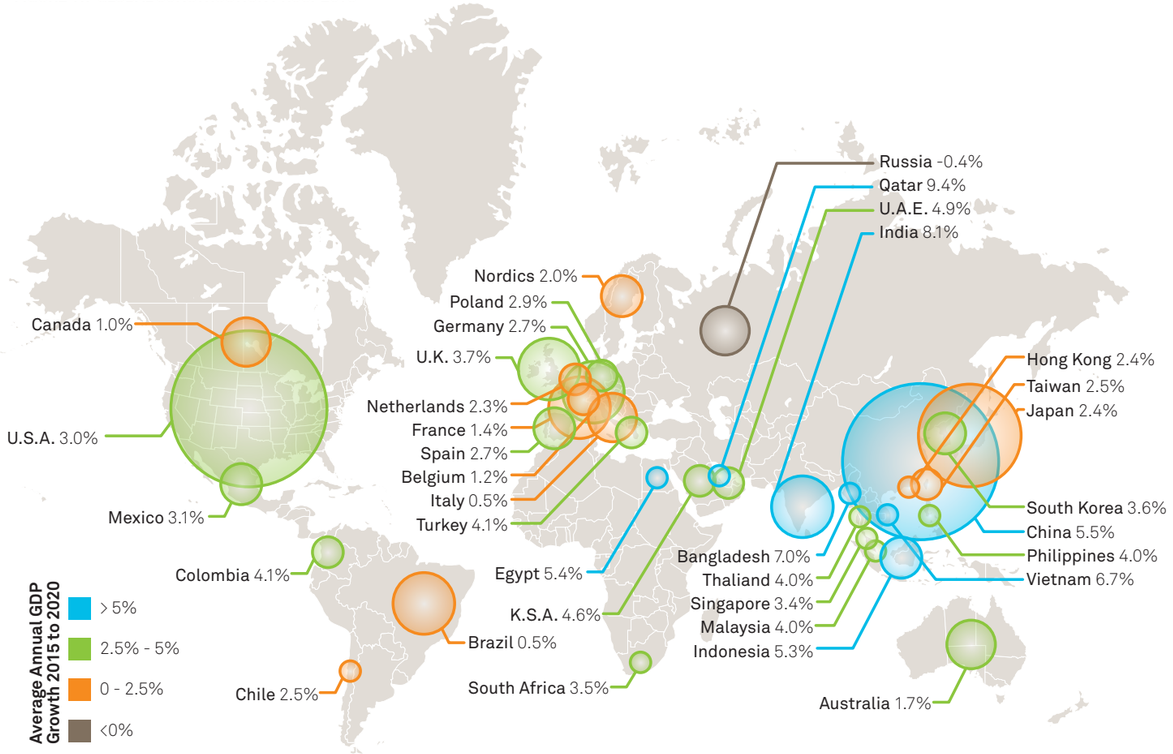


Source: IMF, National Statistics

Global Construction Trends

Global construction activity has been affected by the dramatic drop in oil prices impacting government funds, development costs and investor sentiments. Overall, positive growth is expected at a global level with Asia-Pacific expected to outperform the other regions.

FIGURE 17. GLOBAL CONSTRUCTION PROSPECTS



*Circle size indicates size of construction market

Source: IHS Economics & Country Risk, IMF, National Accounts

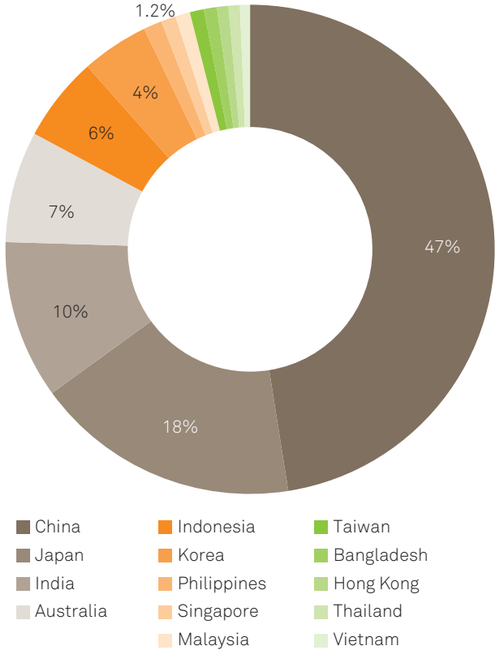
ASIA-PACIFIC

With an annual growth of 7-8 percent over the next decade, Asia-Pacific is expected to outperform other regions and account for 60 percent of the world's construction market by 2025. China continues to lead the pack accounting for close to half of the region's output.

Driven by demographic trends — ageing populations in more mature economies and large young populations in others — investments in healthcare and education are expected to grow significantly over the next decade. However, investments in transportation and manufacturing infrastructure are likely to continue dominating the construction market, making up more than 55 percent of total construction in 2025.

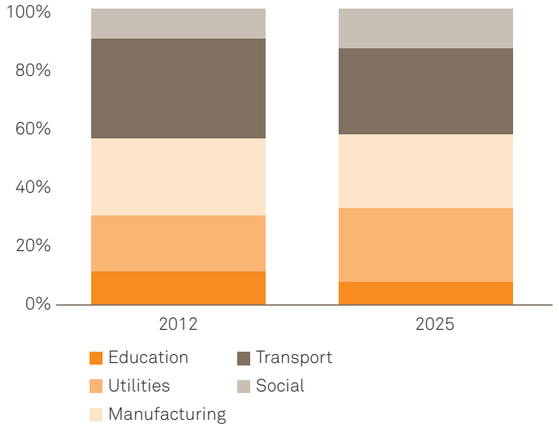
FIGURE 18. SIZE OF CONSTRUCTION MARKET

Based on gross value added



Source: Countries National Accounts (estimates)
Based on Gross Value Added

FIGURE 19. SECTORAL COMPOSITION OF ASIA-PACIFIC INFRASTRUCTURE 2013-2015



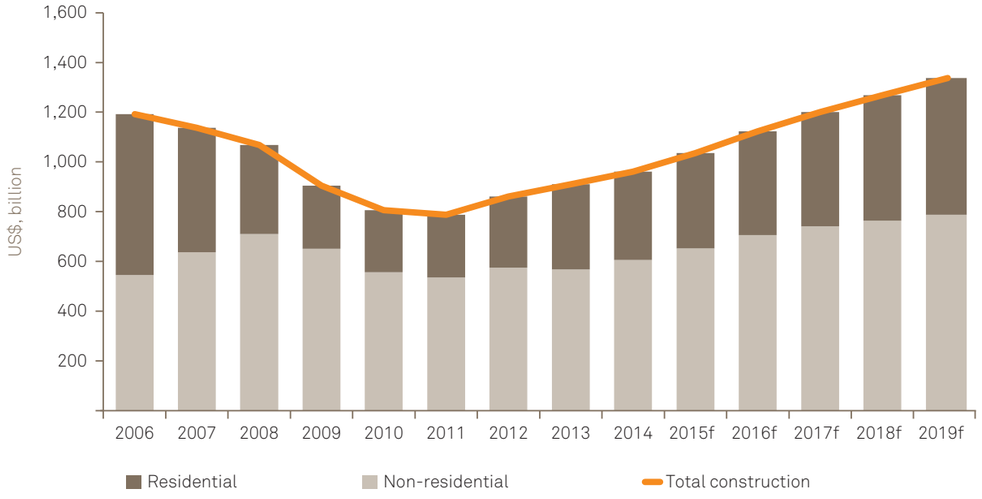
Source: PwC and Oxford Economics. PwC's Capital Project And Infrastructure Spending: Outlook To 2025, Research Findings, PwC, 2014.

NORTH AMERICA

The North American market is expected to grow over the next few years with the U.S. market leading the region. The U.S. construction market is expected to grow at a rate of five percent in 2015, reporting the highest volume of construction since 2008. In comparison, the Canadian market is expected to grow at a rate of 1.5 percent in 2015. Construction growth in both countries is led by the residential sector.

U.S. data reported by FMI notes that while the transportation sector is expected to grow by seven percent in 2015, much needed investment in the country's water sector is lagging and water construction is expected to drop by two percent. Consolidation within the power sector, changes in consumer consumption trends as well as evolving policies impact growth in the power construction market, with a contraction expected in 2015 after strong growth the previous year.

FIGURE 20. U.S. CONSTRUCTION ACTIVITY



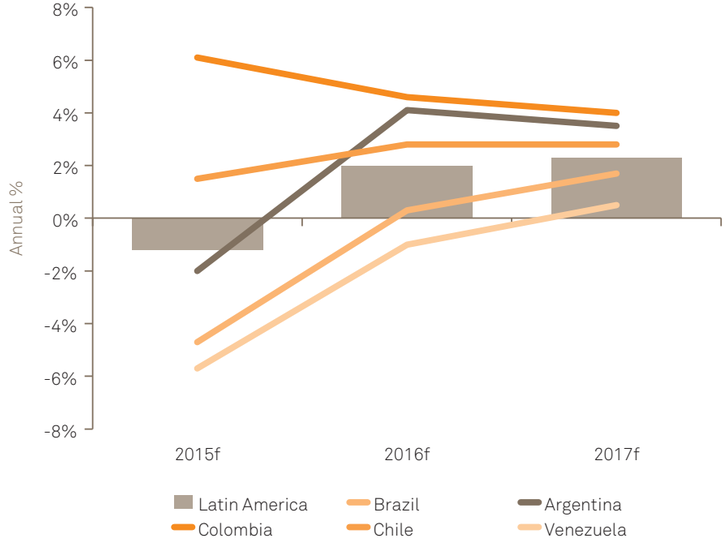
Source: US Census, AIA Consensus Forecast, FMI

LATIN AMERICA

Construction sector growth in Latin America is greatly hindered by the drop in commodity prices, rise in credit costs and high levels of corruption. The latter in particular is having a significant impact on investor sentiment and confidence within the market.

While countries like Colombia and Chile are likely to report positive growth in 2015, slowdowns in large Latin American countries such as Brazil and Argentina hinder regional growth. Spending on infrastructure is expected to grow by a modest one percent over the next five years.

FIGURE 21. LATIN AMERICA CONSTRUCTION GROWTH



Source: KHL

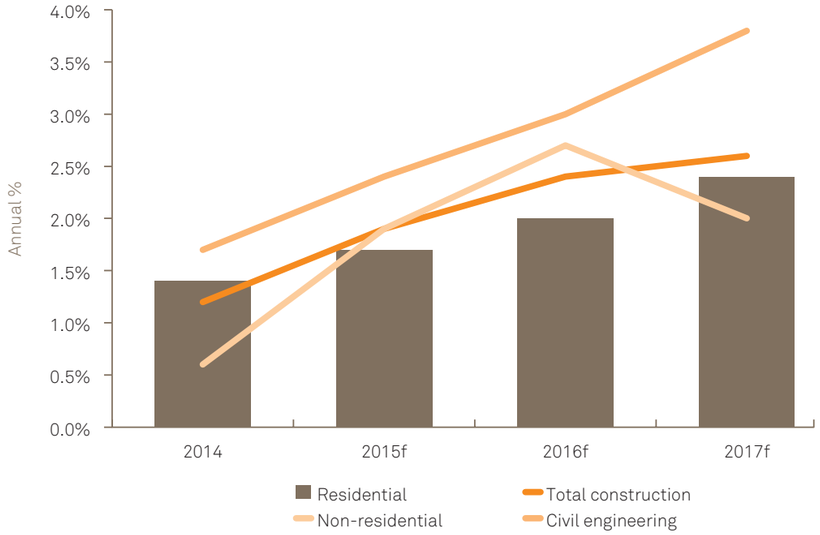
EUROPE

Europe's construction market is expected to report positive growth numbers in 2015, outperforming the regions overall GDP growth rate. Euroconstruct's latest estimates for the 2015-2017 period reflect a growth of 1.9-2.6 percent across all sectors, a much welcomed change after seven years of subdued activity. This increase is supported by lower oil prices. The residential sector continues to dominate the construction activity split, representing around 50 percent of the activity in the sector. However, the fastest growth is expected within the civil engineering sector.

Central-Eastern European countries are expected to significantly outperform their Western counterparts in both residential and non-residential construction. Poland and Ireland are expected to be the fastest growing countries.

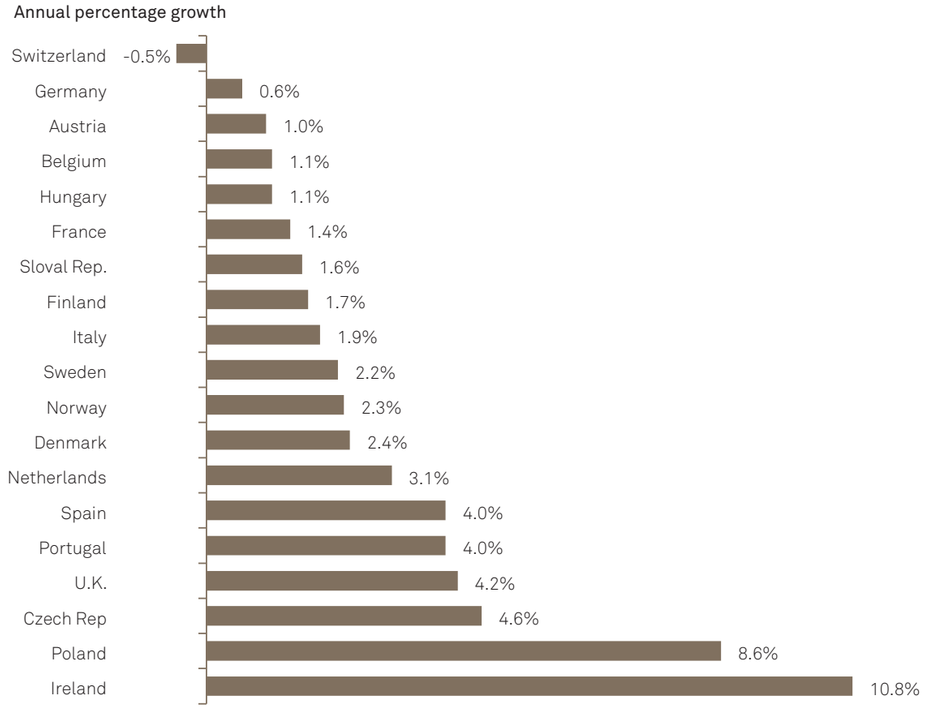
In addition to procurement policy changes resulting from the Council of the European Union directive issued in February 2014, the European construction market is expected to benefit from the implementation of the €315 billion European Fund for Strategic Investments (Juncker's Plan). The fund, approved by the European Council in June 2015, will help European countries to finance much-needed projects including construction ones.

FIGURE 22. CONSTRUCTION OUTPUT GROWTH EUROCONSTRUCT-19



Source: Euroconstruct

FIGURE 23. EUROPE AVERAGE ANNUAL CONSTRUCTION GROWTH (2015-17)



Source: Euroconstruct

AFRICA

Regional economic growth rates for Africa are positive with estimates ranging between 4.5 percent and 5.7 percent in 2015 and about five percent in 2016. Positive economic growth, improvement of business investment environment and the organic need for construction development make the construction market attractive for investors across the board.

While government and private domestic investors continue to own most of the construction developments in the region, the region is quickly attracting more foreign investments. The number of projects owned by China, Australia, India and the United Arab Emirates almost doubled in 2014 in comparison with 2013.

Percentage of construction project ownership		
Owner	**2013**	**2014**
Government	58%	52%
Private Domestic	12%	24%
Europe/U.S.	22%	13%
Intra-Africa	1%	4%
Australia	0%	2%
China	0%	1%
International DFIs	0%	1%
Not-disclosed	1%	1%
United Arab Emirates	0%	1%
Other	0%	1%

Source: African Economic Outlook

Projects within the region are also growing in size. Recent reports by Deloitte note that the size of construction projects undertaken in 2014 has increased significantly to US$1.27 billion, marking an 84 percent increase from the 2013 average.

Transportation, energy and power projects continue to lead the regional project pipeline but significant growth in real estate and healthcare investments are expected in Southern Africa and West Africa respectively.

Section

TWO

Articles

Mixed-use Development Design Trends — Focus on Value-added Designs

Developers are challenged more than ever to deliver projects that meet varying demands from investors and end users. While investors are concerned with return on investment, dividends and financial ratios, end users, ranging from facility operators to individual consumers, have specific needs around functionality, quality and flexibility.

To better improve their business case success rate and reduce associated risks, more developers are moving towards mixed-use developments. Building facilities or communities that house multiple services and end-user needs help diversify income channels and in turn help reduce investment risks.

Mixed-use developments come in many forms, ranging from a single building serving multiple sectors to large plots of land masterplanned to meet all of the living requirements of its intended residents. However, regardless of the size of the development and the primary sector focus (e.g. residential or commercial), three key design trends need to be considered as early as the business case development phase: differentiation, place making (creating a sense of community) and future flexibility.

Differentiation

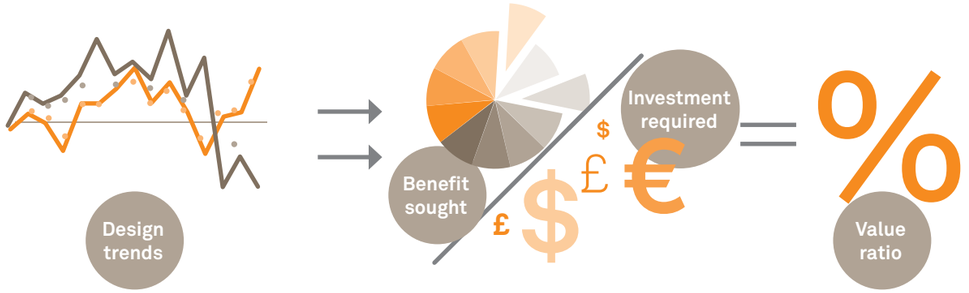
Developers need to differentiate their developments from others. This is best done by identifying a unique mix of elements and services that would attract the intended target market. The chosen mix of elements influences the design of all sectors within the development to create a coherent sense of identity.

Place making

Place making ensures that public spaces and facilities are created in a way that enhances the consumers' experience and create a sense of community within the development. The identity factors used to differentiate the development need to be integrated with the design of the public spaces and facilities to further promote residents' and consumers' emotional connections with the spaces. Community centers, museums, healthcare and educational facilities are examples of public spaces that need to be designed with the development's identity in mind.

Flexibility

While maintaining a focus on identity, developers need to ensure spaces can meet evolving consumer demands. Flexibility and adaptability are essential to increase the probability of the development remaining profitable in the long run.



Successful integration of these trends within a mixed-use development requires a benefit versus investment analysis typical of value management exercises. Only after evaluating the right balance between both can real value be added to the development.

The following sections will outline key areas of consideration within a mixed-use development and will provide insights of typical design trends and value/cost drivers that need to be considered among the various elements that make up the backbone of the master development.

To better improve their business case success rate and reduce associated risks, more developers are moving towards mixed-use developments.

MIXED-USE DEVELOPMENT DESIGN ISSUES TO BE CONSIDERED

The issues listed below form an overarching framework of design factors to be considered in mixed-use developments. A snapshot of design trends, value and cost drivers for infrastructure, transportation and place making components are outlined in the following sections.

1. **Target market:** Developers need to have a clear idea of who their target population is and what their needs are. This involves reviewing the demographic, socio economic and economic factors of the population, all of which will have a significant impact on the development's design.

2. **Plot type:** Greenfield and brownfield plots have distinctive elements that need to be considered early in the design stage. Brownfields generally tend to be higher risk as previous land use and existing services can impact future development of the plots.

3. **Plot size:** Larger buildings and plots can simplify the distribution and transportation networks but also require more complex analysis of support services and functions to meet denser population demands.

4. **Quality of the environment:** Developers need to consider the connections and interactions between the various components of the development, buildings, service facilities and providers. Examples of elements to be reviewed include:

    a. Pedestrian circulation through the site: signposting, traffic management and connections to transport links that facilitate pedestrian flow.

    b. The strength of site identity, achieved by the coherent use of surface materials, textures, features and furniture.

5. **Transportation:** The flow of people and goods within the development and to external areas needs to be planned with the right mix of public and private transport as well as pedestrian and cyclists flow where applicable. Light rail and railway solutions, if not planned as part of private-public partnerships, can have a significant impact on the development's capital and operational costs. Additionally, regardless of the funding option, long-term population growth and forecasts need to be considered to help justify associated costs.

6. **Services infrastructure and distribution:** The volume of services needed, what is available, what is to be developed, and project budgets all have a significant impact on how much, how and where the power, telecommunication and water networks connections will be made.

7. **Phasing strategy:** Depending on the development's size and available funding, phasing strategies might need to be considered. Phasing strategies impact planning, costs and cash flows of the various components of the development and hence careful phasing is fundamental to the development's viability.

8. **Security:** Points of consideration include: perimeter security; safe public access, public space; car parks; roadway barriers and controls to manage access to and use of the site.

9. **Long-term maintenance:** Issues include the upkeep of landscaping, maintenance of common areas and managing alteration works by utilities.

DESIGN TRENDS, VALUE & COST DRIVERS

Infrastructure — Infrastructure is the primary element that makes up the backbone of the development but also the one with the heftiest price tag. Site infrastructure, landscaping and public realm, and car parking are typical components of this element.

Key design trends

Landscaping and public realm	Car parking	Buried services
• **Strong site identity:** Public space is a value-adding element of the scheme. The coherent use of materials, features and design elements increases the occupier's perception of quality and their connection with the space. This in turn translates to commercial viability for the developers. • **Porous pedestrian flow:** By allowing multiple routes to all locations, developers increase the occupier's interaction with the spaces they occupy. • **Clear engaging signage:** Supporting information infrastructure, such as signage to transportation links and other parts of the site facilitate occupier interaction with the development's structures and facilities.	• **Generous spaces:** There is a growing trend towards the specification of generous space allowances and increased headroom to accommodate larger cars and to provide easier access and faster parking. • **Security:** Extensive security measures include CCTV systems and call points, together with user information systems such as space finders.	• **Disruption:** Despite having a higher disruption factor compared to tunneling solutions, buried cables continue to be the norm on most developments. The high cost associated with tunneling is typically only justified within plots and for services where disruption is not an option.

Transportation solutions — Transportation design determines how plots within the development will be connected as well as their connection with plots outside the development, hence, design consideration should include both internal and external connection factors. Depending on the size of the development, transportation options can range from roads to metro/tram connections to railway stops. Rail connections in their varieties tend to be investment heavy initially and a long-term plan needs to be reviewed to justify the investment.

Key design trends

- **External connection:** Focus on developing solutions that can be easily integrated with external connections.
- **Transit-Oriented Developments (TOD):** Transit solutions are designed with the intention of creating transit-oriented developments to facilitate commuting and to provide better connectivity with minimum impact.
- **Third-party use:** Integration of third-party uses, including transport operators and retail.
- **Landmark designs:** Balancing the need for landmark design with the use of a limited palette of robust and standardized materials and details.

Place making facilities — Creating communities with mixed-use facilities and services helps to improve the quality of life within the community. A common area of investment in this realm is art and culture developments, e.g. museums and theaters. Healthcare and educational facilities, while considered standard elements within a development, are attractive areas of investments and careful integration can significantly contribute to the development's value and identity.

Key design trends		
Museums and art galleries	Educational facilities	Healthcare facilities
• **Iconic designs:** Budget permitting, creating spaces with iconic designs using quality durable materials. • **Flexibility:** Creating flexible spaces and environments to allow for different types of exhibits and events. • **Security:** Focus on security throughout the facility to ensure the security of high-value objects. • **Third-party use:** Integration with third party uses including gala functions and retail outlets.	• **Personalized learning:** Creating learning environments that allow for personalized project-based learning in a variety of settings. • **High technology integration:** Responding to the challenges and opportunities presented by information communication technologies — for instance multiple sources of knowledge, collaborative working and access to web forums. • **Demonstration of sustainability initiatives:** Easy-to-use controls and information displays to monitor energy performance and savings; visible use of natural lighting and ventilation. • **Sense of place:** Creating welcoming and inspirational spaces with wide corridors allowing for good sight lines and layouts.	• **Accessibility:** Ease of access to healthcare; facilities embedded within residential communities and shopping malls are more accessible. • **Creating functional therapeutic spaces:** Optimizing circulation routes and clinical adjacencies with a focus on personalized patient experiences and intended space functions. • **Flexibility:** Creating a smaller number of room-size modules and providing universal clinical space for medical departments and specialisms. • **IT adaptability:** Flexibility to adapt to technological advancement and future innovations. • **Demonstration of sustainability initiatives:** Easy-to-use controls and information displays to monitor energy performance and savings; visible use of natural lighting and ventilation. • **Managing cross infections:** Considering space layouts, segregation of functions and use of high-efficiency filters as ways to manage cross infection. • **Security:** Focusing on security throughout the facility including internal control points, external entrances and secure storage for medical equipment. • **Wellness centers:** Responding to the growing market of elective and non-acute care services, which usually combine with tourism.

General lalue and cost drivers	
• Site and local environment improvement • Integration of internal transport systems • Connectivity with external transport links • Ease of parking (parking space allowances) • Use of advanced technology/IT and end user interaction • Ratio of passive to active sustainability initiatives	• Quality of materials used • Creation of place (sense of community) through use of open spaces and interactive facilities • Security solutions and technology used • Specification of high-quality facades • Specification requirements of facility operators • Long-term flexibility and adaptability

ESTIMATING RATES BY ASSET

The capital cost rates indicate the range of expenditure for normal design and specification criteria, rather than maximum and minimum possible costs based on a U.A.E. location. The rates are based on exclusions and assumptions, please refer to section 4.

Infrastructure and landscaping	USD/m²
Roads and public routes	30
Public realm and landscaping	15
Drainage	10
Utilities	70

Car park type	USD/m²
Multi-storey	520-650
Basement (shallow basement assumed)	760-930

Transport	(GIA) cost USD/m²
Railway stations	3,500

Museum/art gallery type	USD/m²
International-standard art gallery/museum	6,000+
Regional-standard art gallery/museum	4,500 - 6,000
Local-standard art gallery/museum	3,000 - 4,500
Note: Owning to the iconic nature of galleries and museums there is no upper limit to the budget for an international standard building.	

School	USD/m²
Primary and secondary school	1300 - 1625

Healthcare	USD/m²
Community hospitals	2,500 – 3,100

Capital Reserve Funds — a Switch to Proactive Asset Management

Asset management as a discipline is growing in maturity in the Middle East thanks largely to the fact that after a sustained period of investment and continuing construction, there is now a substantial amount of relatively new built assets to manage. Furthermore, the number of built assets in the MENA region is forecast to grow by 43 percent by 2020, second only to the growth of the emerging Asian market. In this article we explore an element of strategic asset management that is providing not only the means to manage effectively but is driving the culture of proactive rather than reactive maintenance across the region: reserve funds.

The first challenge to getting an adequate reserve fund in place for a built asset in the Middle East is getting the buy in from property owners, developers and occupiers to establish such a fund at all.

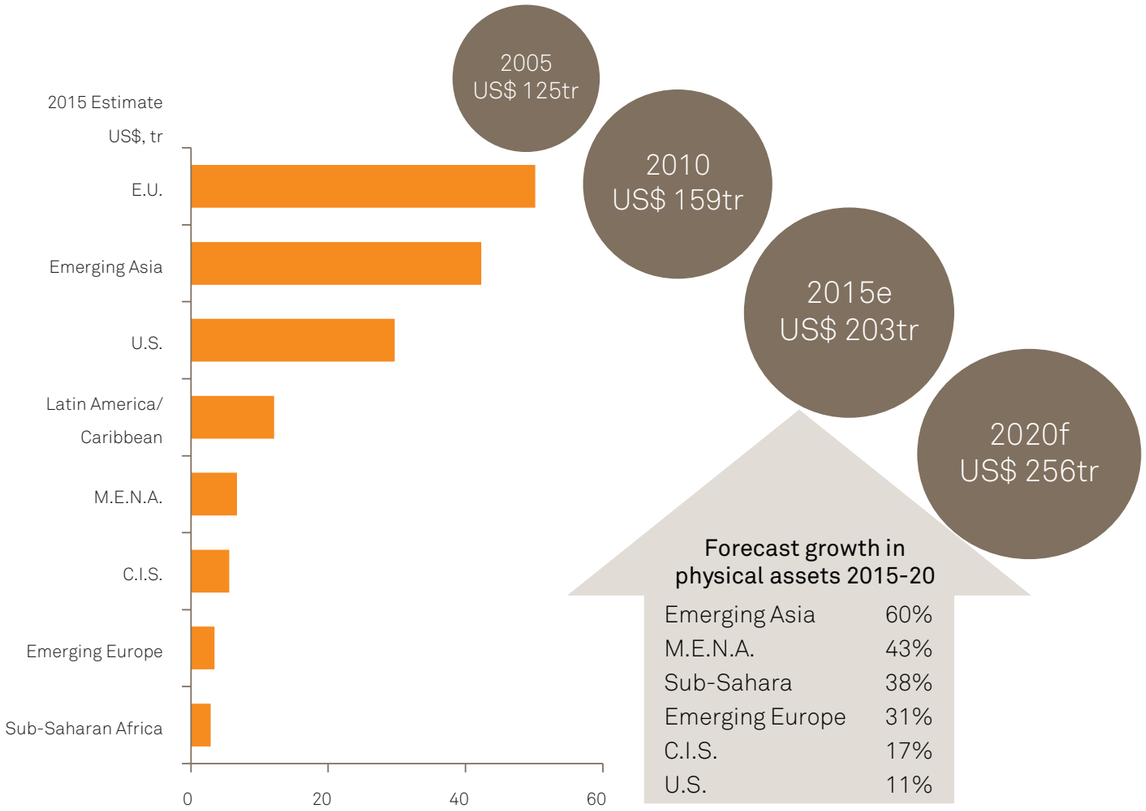
CAPITAL RESERVE FUND — THE BASICS

Reserve funds can be considered proactive as they effectively represent expenditure on maintenance that is not yet required, but will be required at some point in the future. Having funds in place to finance such expenditure instead of seeking the funds after the need arises is not just a proactive approach, it is a professional one. Reserve funds can be used for periodic works such as redecorations and deep cleaning, or provide funds for significant asset replacements at the end of their operational life, such as lifts or air handling units. It is perhaps the need for asset replacements that puts the most strain on these funds, and the key reason for ensuring that the funds in place are adequate for the assets they are intended to cover.

CHALLENGES

The first challenge to getting an adequate reserve fund in place for a built asset in the Middle East is getting the buy in from property owners, developers and occupiers to establish such a fund at all. The next challenge would be to ensure that it is correct and fit for purpose. It is important to recognise, as the Real Estate Regulatory Authority (RERA) in Dubai has recently done, that reserve funds should be based on a study of the assets covered rather than a provision based on some market-sensitive acceptance of what a reserve fund contribution should look like.

FIGURE 24. PRODUCED CAPITAL OF PHYSICAL ASSETS



Source: IMF, World Bank, AECOM Estimation and Forecast Produced Capital

This approach can be considered best practice in its intentions at the very least, but implementation of such studies and a common approach to the methodology is left to the open market, pushing such services into a cost/value argument that puts the emphasis back onto just how much those that are paying for the service understand the importance or the benefits. Throw into the mix some inefficient building designs, various methods for accounting for regional climatic factors on asset life expectancies, a range of international standards that can be referenced in various combinations (or not at all) and the market becomes one of varying quality where the implications of getting it wrong are not yet being felt.

The fact that buildings cost far more to operate and maintain than they do to construct means that regional developers are paying more attention to asset maintenance and lifecycles.

DRIVERS FOR CHANGE

Understanding the risks of poor reserve fund planning would be the most significant driver for their adoption to strategic level asset management. Not having funds in place to replace a key asset when it fails will have financial implications not just in terms of finding the capital required, but will also affect the occupier's experience and their confidence in the building's ability to function as intended. Immeasurable reputational damage both to the owner and to the building (not to mention the occupier if they are providing commercial services) may be felt far beyond the tangible lost revenue and repair costs.

Understanding this is perhaps the difference between simply complying with legislation and actively seeking to implement best practice. Awareness of the benefits of operating an accurate reserve fund and the switch to a proactive approach will undoubtedly see property and asset management practices improve for investors and occupiers as planned maintenance becomes a long-term conversation rather than year-by-year budget consideration based on whatever funds can be spared. After all, a happy occupier is more likely to pay market rent on time and remain in occupation if there is confidence that the building will perform as required during their tenancy, even if seemingly cheaper accommodation is available elsewhere.

The risk of experiencing breakdowns and service interruptions is at the forefront of any business owner, as it should be for any building owner. Attitudes are also changing due to buildings being increasingly owned and operated by their developers post completion. The now very well recognised fact that buildings cost far more to operate and maintain than they do to construct (20 percent build, 80 percent operate being the generally accepted ratio) means that regional developers are paying more attention to asset maintenance and lifecycles as they switch from 'building to sell' to 'building to own', thus creating an environment where reserve fund planning begins during design and construction as part of a wider strategic asset and facilities management service offering.

IS THE CAPITAL RESERVE FUND SUFFICIENT?

So the appetite is there. The risks are understood and the benefits appreciated. But how do you ensure a reserve fund that is truly sufficient? Ultimately time will provide judgment on the issue of 'fit for purpose', but a clear understanding of the basic components that allow for an accurate reserve fund to be developed should now be the focus. These can be summarised as follows:

1. **Asset data**
   The study should be based on accurate asset data. This means not only should up-to-date verified asset registers be available but it should also be within the owner's capability to identify the condition of those assets, using either visual inspection or review of maintenance records and historic asset performance data. As starting points go, it is perhaps easy to understand why reserve fund planning becomes more of an art than a science. Complete asset registers, such as built drawings and O&M manuals, are not always made available at handover making the subsequent sourcing of this information for use in a reserve fund study a difficult and time consuming task.

2. **Life cycle cost analysis**
   Once the assets are known, the application of life expectancies and plotting replacement cycles can be applied with reference to international standards, with regional factors that local asset managers should be able to apply through first-hand experience. Such regional experience can extend to understanding how systems designed to work in more temperate climates behave in the Middle East and how to account for any changes in performance through adjusted maintenance regimes or reduced life expectancies.

3. **Economic variables and capex data**
   Capital replacement costs at the point of installation or construction must be noted as these will form the basis of replacement cost projections within the reserve fund. An understanding of inflation — in particular inflation applicable to the construction industry — together with interest rate trends, forecasts and a clear methodology of how to apply these to the replacement cycles identified in the life cycle cost analysis make up the core economic expertise needed for an accurate reserve fund. This element can be overlooked in terms of its importance, but in reality getting these figures wrong has dire consequences for the reserve fund's ability to meet its commitments. It could also tie up much more capital than required in a fund that simply does not need to be as big as it is, with the opportunity cost of reduced liquidity coming into play.

Modeling a reserve fund and providing a rate at which contributions to the fund should be made, however apportioned, should be possible to a large degree of accuracy with these three key components in place. The skills required to acquire this information draw from a range of disciplines, including surveyors, engineers, facility managers and economists.

One of AECOM's key advantages is that it has the resources, including economists, based in the Middle East to draw upon and conduct reserve fund modeling. First-hand data from cost managers drawn from hundreds of completed projects and detailed, regionally-specific economic research by in-house economists and business intelligence professionals provide a robustness that many other property consultants would find hard to match.

SERVICE CHARGE RANGE AND RESERVE FUND — DUBAI RESIDENTIAL

Benchmark data in the Middle East is difficult to obtain and the attitude towards sharing data is something that arguably should be embraced by the property industry for the benefit of the individual developer and the market in general. A good start has been made in Dubai by RERA with its Service Charge Index, which was introduced recently. The table below outlines the RERA Service Charge range for residential properties as charged by landlords to tenants.

Annual Service Charge (AED/square foot)		
	Service Charge Range (AED/square foot)	Reserve Fund Share in service charge
Apartments	6.8 - 21.8	3%
Villas	1.4 - 5.3	9%

Source: RERA Service Charge Index

The Reserve Fund proportion as charged to tenants is provided in this data set. On average they represent three percent of the service charge for apartments and nine percent of the service charge for villas. The averages charged to tenants are some way off the Reserve Fund typically required as calculated by a Life Cycle Cost study. Based on typical calculations the Reserve Fund required are multiples of the facilities management service charge. The degree to which the full Reserve Fund charge is recoverable from the tenants (i.e. passed on to tenants) is a commercial decision to be made by developers and based on the markets propensity to absorb the Reserve Fund recovery and the developers overall strategy to build up the Reserve Fund.

As a ballpark guide, the full Reserve Fund required based on typical Life Cycle Cost studies and represented as a percentage of capital cost is in the range from four to six percent of capital costs per year. This is based on the assumption that assets are constructed to a good standard, are maintained in accordance with best practice standards, and that the typical asset lifespan is in accordance with published benchmarks i.e. CIBSE Guide M.

The table below provides a relative range for service charge rates in relation to residential asset class, assuming good quality assets with average service levels. This is a conceptual comparison based on assumptions and high level averages across sectors.

Sector	Service Charge Cost Relative Comparison
Residential	1.0
Education	1.0
Retail	2.5
Commercial	2.0
Healthcare	3.0

CONCLUSION

The continued adoption of reserve funds not only in Dubai but the entire Middle East should be seen as a vital tool for strategic asset management and the protection of real estate as a viable investment. The region is at the start of a process where attitudes and awareness are developing and becoming more receptive to the process of reserve fund planning. Furthermore it is truly encouraging to see the start of data sharing by RERA in Dubai. This momentum needs to be continued with the extension of the Service Charge Index, similar indexes published in other territories and the application of accurate reserve funds within both residential and commercial service charges so that real estate markets can mature.

An understanding of the necessity for adequate reserve funds is not enough though — the expertise required to construct them must be procured in the same way that expertise is procured to construct the assets in the first place. It is never too late to review a building's reserve fund, but the opportunities to effect change and gain the most value from doing so are most effective at the early stages of a project.

Utilizing BIM for Project, Organization and Industry Success

An emerging number of organizations involved in the built environment are looking to Building Information Modeling (BIM) not only as a way of delivering a project, but also as a solution to capture, store and analyze their business, operational and market data. These forward looking organizations are seeking to efficiently capture, store and analyze inter-functional data (design, cost, construction, operation and market), not by exception but as standard operating practice.

While technology (such as integrated BIM, Business and Asset Management systems) may be the conduit for this, it can be argued the true driver is a rethink of standard operating models (organizational and project processes), greater openness towards informed analytics and changes to industry culture and behaviors.

BIM AT A PROJECT LEVEL

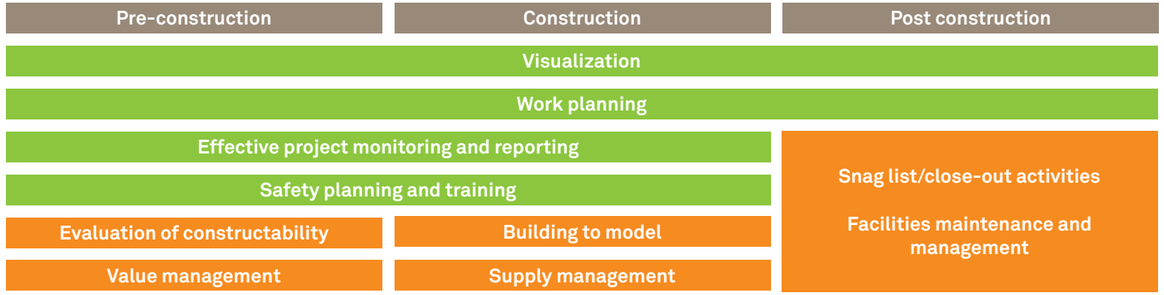
Building Information Modeling (BIM) is an integrated project delivery solution that allows project stakeholders to share and build on facility design information throughout the project lifecycle. But the solution does more than just provide 2D and 3D representations of a facility; it permits time and cost data integration allowing project stakeholders to create 4D (including time) and 5D (including cost) models of the facility.

Pre-construction the main focus of architects and engineers is in visualizing the design intent of the facility and evaluating its constructability. Schedule and cost data can be integrated at this stage allowing the project team to conduct more accurate value engineering and management exercises as well as estimating construction quantities. Coordinating trades, planning jobsite work and safety training are also typical uses of BIM at this stage.

Primary uses **during construction** are to guide works on site and to allow for more accurate and regular progress reporting. With the use of augmented reality and laser scanning, building progress can be checked more accurately. Integrating the model with GPS further allows for controlling equipment on site and using model-driven robotics.

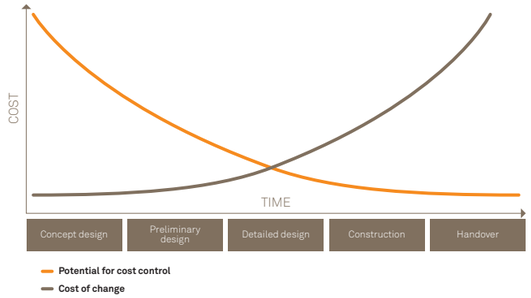
Post-construction, BIM is used to provide owners with an accurate model of what was actually built and enables management of close-out activities. Addition of maintenance and operations data to the model at this stage further allows owners and facility managers to manage the facility post construction.

FIGURE 25. KEY APPLICATIONS OF BIM DURING THE PROJECT LIFECYCLE



Looking at the list of BIM uses throughout the project lifecycle, it is clear that effective implementation of BIM can result in substantial positive returns at the project level. Benefits reported by users are numerous however, improved efficiency through the reduction of errors and rework is frequently cited as a major benefit for implementation. By building a digital version of the facilities and then building to the model, conflicts in design or construction work can be anticipated early and associated risks mitigated.

FIGURE 26. BENEFITS OF EARLY IDENTIFICATION OF CHANGES



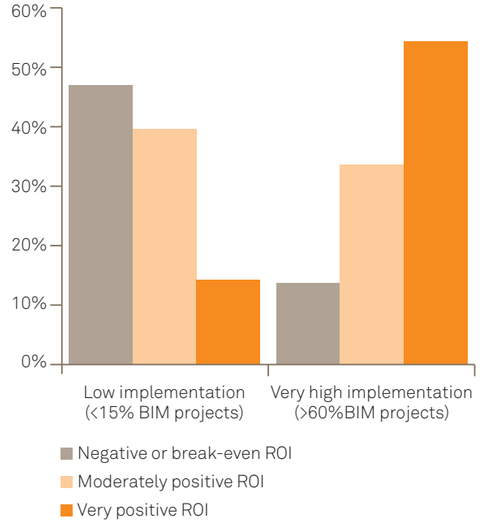
BIM AT A BUSINESS AND INDUSTRY LEVEL

BIM benefits also extend well beyond the project level enhancing business operations and improving quality of work within the industry. Through their annual surveys of value of implementation within businesses, McGraw Hill has consistently reported that higher levels of BIM implementation correlate with greater perception of positive returns on investment.

Averaging scores reported between 2013 and 2014 for the US and Australia, it is clear that high implementers perceive a very positive return on investment within their businesses. This perception is commonly associated with higher efficiency in delivering projects as organizations develop a library of information that can be used and integrated across projects. This is true for all businesses involved in the process ranging from owners to trade specialists. Designers, engineers and contractors commonly report an additional benefit of using BIM is an improved company image and service offering.

Designers, engineers and contractors commonly report an additional benefit of using BIM is an improved company image and service offering.

FIGURE 27. PERCEIVED BENEFIT OF BIM BY LEVEL OF IMPLEMENTATION



Source: McGraw Hill

Through the repeated implementation of BIM across projects and within businesses, the overall quality, efficiency and safety on projects within the industry improve. As part of its annual review of BIM implementation across the world, McGraw Hill has asked respondents to list their perceived value of BIM. Closer examination of the respondents answers, which are in line with what respondents had said on a similar BuildSmart survey conducted in 2009, allow us to categorize the responses at a project, business and industry level.

FIGURE 28. BENEFITS OF BIM FOR PROJECTS, BUSINESSES AND THE INDUSTRY

	Benefits	Project level	Business level	Industry level
Short term	Reduced errors and omissions	■		
	Reducing rework/improved efficiency	■	■	
	Better cost control/predictability	■	■	
	Reducing cycle time of specific workflows	■	■	
	Faster regulatory approval cycles/visualization enables better understanding of proposed designs and works	■	■	
	Enhancement of organizations image as an industry leader		■	
	Offering new services		■	
	Ability to work collaboratively	■	■	■
	Analysis and simulations produce a more well-reasoned design	■	■	■
Long term	Maintaining repeat business with past clients		■	
	Increased profits		■	
	Reducing overall project duration	■	■	■
	Reduced construction cost	■	■	■
	Improved safety	■	■	■

Through their annual surveys of value of implementation within businesses, McGraw Hill has consistently reported that higher levels of BIM implementation correlate with greater perception of positive returns on investment.

WHAT DO WE NEED TO DO TO GET THE MOST OUT OF BIM?

In the main, industry stakeholders are aware of the benefits of BIM, however, turning this awareness into a commitment and effective implementation is the challenge. Top barriers to implementation commonly cited by stakeholders are cost, lack of skills and regulation, and ineffective cooperation on the project. A closer examination of each barrier and recommendations for resolution are provided below.

Cost – Implementing BIM at any level is an investment. Project leaders, owners and businesses need to consider the return on investment in implementing BIM rather than just focus on the initial cost associated with the implementation. Investment returns for BIM go beyond reduction in construction costs, non-financial returns associated with improved project efficiency, improved safety as well as enhancements of brand and service offerings all need to be considered.

Lack of skills – Without the business and people intelligence to guide the implementation and execution of BIM, the real benefits of BIM cannot be realized. A substantial number of BIM users frequently report that they are self-trained, while this does not substitute formal training it shows that with the right commitment, adopting BIM is not impossible. Additionally, high staff mobility in today's world helps expand the resource pool beyond locally available experts. Until the needed industry standards, certifications and trainings are made readily available, the dynamic flow of resources can help mitigate the shortage of local resources.

Lack of mandate and regulation – There will always be resistance to change, particularly when working on projects that are inherently complicated or are fast tracked. BIM advocates note that the best way to overcome resistance is through the development and implementation of industry-wide standards and regulation. However, until the industry-wide frameworks are developed, owners can demand the use of BIM on their projects and businesses can develop the required processes for them.

Ineffective cooperation – BIM is a highly collaborative tool, without the needed level of collaboration, the true functionality of BIM cannot be realized. Project teams need to work together on BIM implementation throughout the project lifecycle with established frameworks set on how information will be shared, where it will be stored and the standard BIM terms agreed.

FIGURE 29. TOP BIM BARRIERS AND RECOMMENDATIONS FOR MITIGATION

Barriers	Projects	Businesses	Industry
Cost	Adopt investment view Budget for BIM as needed		
Skilled resources	Global mobility		Set up certification and training programs
Not mandated	Offer to owners and clients as added-value service	Champion process internally	Set as requirement
Availability of standards	Set project standards	Set business processes and standards	Set industry standards
Knowledge sharing	Set up secure cloud or server platforms to allow for easy transfer and sharing of information among project/business stakeholders. Agree on terms and nomenclature.		Set standards and regulations for knowledge sharing

IMPLEMENTATION OF INTEGRATED BIM, BUSINESS AND ASSET MANAGEMENT SYSTEM

Property, construction and infrastructure industries are investing more to align their data and produce informed analytics that support decision making. The value proposition of this analytics approach has evolved in recent years to include more integrated systems.

The integration of BIM, Business Asset Management and Geographic Information System (GIS) technology is revolutionizing the way property and infrastructure companies are planning, designing, delivering and managing assets. Although BIM, business systems and GIS have been embraced by asset owners independently, most of this information is stored in separate databases that cannot talk to each other, leading to the duplication of effort, uncertainty in the validity of information and more complex management of separate workflows. Complex organizations require fast and reliable access to vast amounts of information. When data is transferred from one system to another, this leads to the potential for reduced accuracy as the margin of error increases. The integration of BIM, GIS and business management technology removes these issues by providing access to current, consistent and reliable data to inform and speed up robust decision-making processes.

FIGURE 30. FRAMEWORK FOR IMPLEMENTATION OF AN INTEGRATED BIM AND BUSINESS ASSET MANAGEMENT SYSTEM

	Task	Approach	Outcome
Validate	Validate business requirements	Systems, procedures and standards to allow an organization to record, map and manage its assets and operations through a GIS, BIM, asset management integrated technology platform.	Fundamental review of current practice and value of adopting integrated asset management platform.
Review	Review existing system structure	What data exists? How is it collected and stored? What attribute data is required for lifecycle management?	BIM/GIS standards for the collection and management of asset management data.
	Review adequacy of resourcing requirements	Integrate the digital flow of data across planning, design, development, delivery, operations and maintenance requires specific capabilities.	Integrated departments.
Develop	Technology upgrade options assessment & procurement	Develop technical specification and assist in scoping of procurement process to bring latest technology to the organization.	GIS/BIM/Data normalization hub.
	Develop return on investment (ROI) metrics	How does the new system differ from the status quo? What is the operational expense profile? Set reduction targets.	Develop benchmark for operational expenditure to capture and measure return on investment.
	Develop implementation road map	Staged implementation road map for the tools, standards and resources required to ensure positive return on investment in the shortest time frame.	Comprehensive asset information platform that supports the sharing of data across the business.

BIM ADOPTION AROUND THE WORLD

Global adoption of BIM has been mixed due to a combination of the typical barriers listed earlier in this article along with market maturity and culture. The table below provides a sample of countries where BIM is already mandated or is soon to be mandated.

Country	BIM Enforcement Level
Australia	Gaining popularity but not yet mandated and framework not yet established.
G.C.C.	Gaining popularity and industry-wide implementation on authorities' agendas. Dubai is the only city that has mandated implementation on large projects.
Hong Kong	Required by Hong Kong Housing Authority.
Netherlands	Required by Ministry of Interior for large building maintenance projects.
Norway, Denmark, Finland	Strongly encouraged and in some case mandated by a number of state clients including the Danish Palaces & Properties Agency and Finland's Senate properties.
Singapore	Mandatory for projects of more than 5,000 square meters.
South Korea	Will become mandatory for all public sector projects over US$50 million by 2016.
U.K.	Level 2 BIM expected to be mandated on all government projects by 2016. (UK government Level 2 BIM — Managed 3D environment with data attached, but created in separate discipline models.)
U.S.A.	General Services Administration has mandated BIM use on all federal buildings. Army Corps Engineers have mandated BIM use on all their projects.

IN FOCUS: ORGANIZATIONAL BIM CAPABILITY — PERCEPTION AND IMPLEMENTATION IN THE MIDDLE EAST

Delivering large-scale programs on time and on budget remains a major challenge for the construction industry. Respondents to AECOM's 2015 Middle East Construction Survey report that the majority of their projects fail to be delivered either on time or on budget. This is despite the adoption of promising productivity enhancement technologies such as BIM.

It has been widely recognized that project performance could be increased significantly by better use of BIM, and according to the industry players the sector needs to consider why it has not achieved greater levels of project performance and find solutions to how to embed a stronger culture when it comes to adoption of new technologies. As part of our 2015 survey, we asked industry stakeholders their view on BIM and whether their organizations have invested in BIM systems and training. The majority, 80 percent, reported that they believe they have adopted BIM technology and judge their organizational BIM capability as level three or higher, which means that organizations have adopted the technology at least formally, if not optimizing and continuously improving the BIM process.

FIGURE 32. BIM AND PROJECT PERFORMANCE

In your opinion, has investment in BIM helped deliver projects on time and to budget?

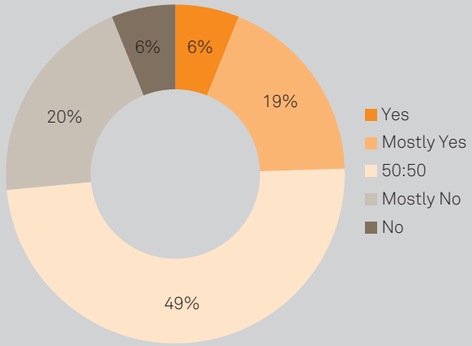


FIGURE 31. PERCENTAGE OF MIDDLE EAST PROJECTS DELIVERED ON TIME AND ON BUDGET

Respondents opinion

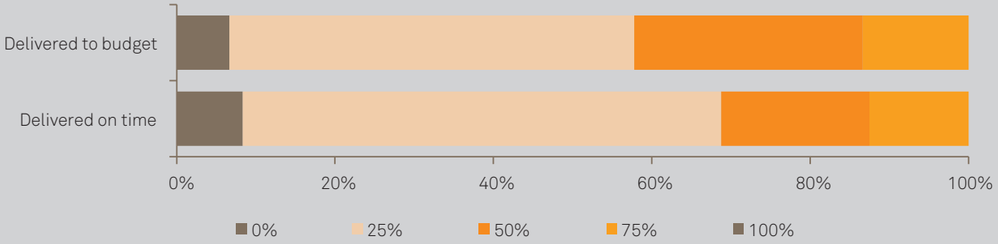


FIGURE 33. ORGANISATIONS' BIM INVESTMENT AND CAPABILITIES

Has your organization invested in BIM systems and training?

Organization's BIM capability rating

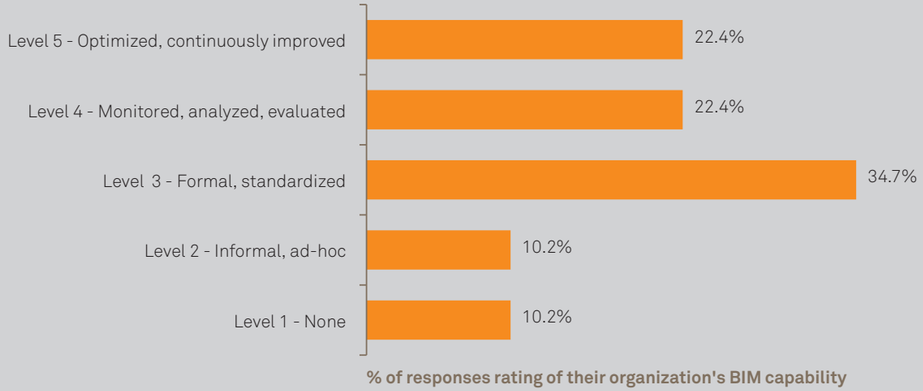


FIGURE 34. MAIN FACTORS PROHIBITING THE EFFECTIVE USE OF BIM

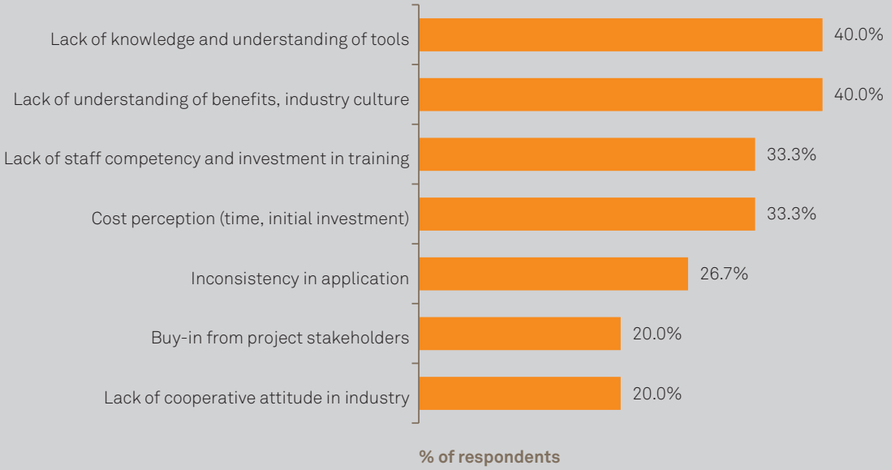
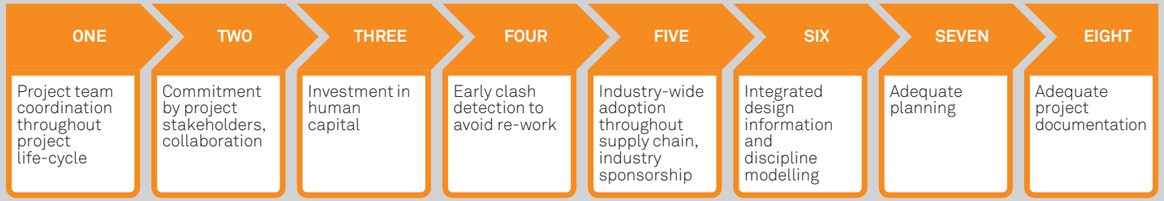


FIGURE 35. BIM SUCCESS FACTORS



However, this high level of implementation did not correlate with an appreciation of value added by implementing BIM on their projects. While our survey shows that the majority of respondents have invested in and is using BIM, only a quarter judges that this investment has improved project performance.

This deviation from typical survey responses received across other regions could be due to many reasons including ones listed by the respondents stating the main prohibiting factors are a lack of understanding of the benefits of BIM, coupled with an industry culture that appears to be reluctant to change, as well as being often characterized by adverse stakeholder relationships. In addition, whilst investment in the technology has often been made, there appears to be a lag of investment in human capital and training, which is leading to inefficient use of the systems and inconsistency in application.

To capitalize on BIM's proven results to enhance project knowledge and delivery, the industry has highlighted a number of key success factors. Across the survey respondents, the most widely cited success factors is project team coordination and collaboration throughout the project life cycle, a behavioral factor rather than one of system investment and implementation. Similar, commitment by project stakeholder and industry wide adoption throughout the supply chain are key to efficiently using BIM to enhance project performance.

Global Unite and GUIDE

AECOM has developed Global Unite and GUIDE (Global Unite Indicative Design Estimate), its own international benchmarking and project performance knowledge system. The intelligence that we have gathered from our involvement in thousands of projects greatly assists us to benchmark project costs and design efficiencies when establishing construction cost estimates for proposed projects.

In this era of data on demand, it has become increasingly important to be able to deliver insight that is evidence-based, data-backed and rapid. We can now quickly analyze parameters that define how effective or efficient an asset is (or is not) against local or global standards for similar asset types.

A truly global project database must consider the regional nuances that define local markets. Each region in AECOM's Global Unite network has subtle variations that reflect the elemental breakdown structure to ensure the capture of cost and quantity data is appropriate for local projects and comparable for international benchmarking. Although construction cost information is specific to a particular location, design benchmarks can be extracted and analyzed for the benefit of driving efficiency across differing project types globally.

As an example, the ability to compare the efficiency of a 'façade-to-floor ratio' on an office tower can be applied no matter whether you are in New York, London or Dubai. This information can then be used to assist the client in creating efficient and cost effective outcomes.

Global Unite is available to clients wanting to benchmark their own projects. For clients who have large capital programs or who undertake numerous construction projects, AECOM can provide Global Unite as a service whereby we can create a tailored solution that will capture and manage the client's data and configure specific benchmarks and reports that add value to their decision-making processes.

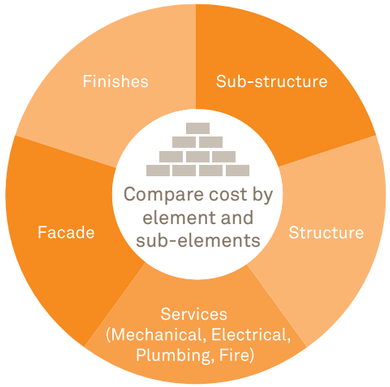
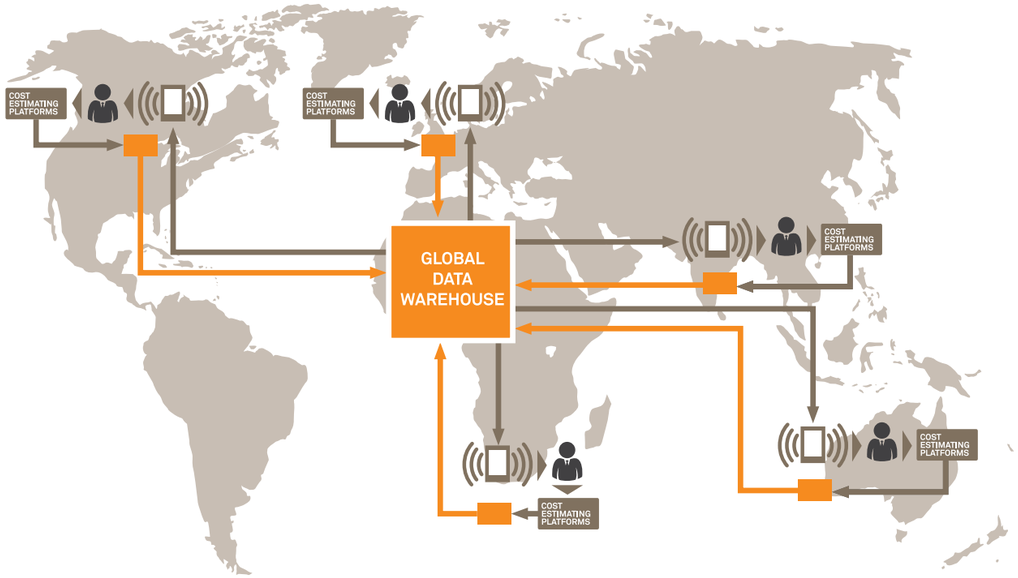


FIGURE 36. GLOBAL COST AND DESIGN BENCHMARKING NETWORK



Global Unite is available as a web and tablet app for both iOS and Android. Using GUIDE, AECOM can quickly and easily create early construction cost advice for clients who are considering new projects. GUIDE draws on the database of project information contained in Global Unite and provides construction cost advice based on similar projects.

The parametric model can be used to create a construction cost model relevant to the client's latest project. By adjusting elements such as floor area or other key benchmarks including functional units, a comparison against world's best practice can be assessed.

BACKGROUND AND CASE STUDY

Benchmark construction information has been in high demand from clients of construction services for many years. Organizations ranging from economists and construction consultants through to governments and major consumers of construction services have been clamouring for a global benchmarking solution. However, the disparate sources of information and the need for confidentiality prevented cost consultancies from being able to present and share the benchmark data they had with their clients.

To meet this challenge AECOM initiated the Global Unite and GUIDE project. This involved capturing snapshots of project information from AECOM's bespoke cost estimating tools (e.g. CostX) into UniPhi's enterprise software application. This information would then go through a new and improved quality assurance methodology within the core UniPhi enterprise portfolio software application. UniPhi's software development team then built a global data warehouse and analysis services model that would harvest this information to be used within any of the 120 offices around the globe.

Initially, access to the data was through the analysis services excel add-in and some customised reports embedded in the UniPhi enterprise portfolio application. The issue here was that the data could not be accessed outside of AECOM's office and did not have any estimating capability in itself. AECOM felt there was an opportunity in the market to provide early stage cost estimates to clients who are looking at strategic options by leveraging the immense data that now existed in the Global Unite data warehouse.

AECOM decided to utilise UniPhi's project management and software development expertise as well as the close working relationship that had been developed throughout the Global Unite project to develop a new product called GUIDE. The key requirements for this product were for it to be accessible via a tablet as well as through a web browser on a PC, and that it could be used anywhere there is an internet connection. The key functionality is the parametric models for estimating the price to complete construction and infrastructure projects with very little design definition and the output of benchmark reports.

The parametric model is the most valuable part of GUIDE. It allows a cost consultant to sit with a client in a café or on their premises and work through some basic design parameters to get an indicative cost for any type of building and for any type of construction (e.g. new build or refurbish). This capability means that AECOM cost consultants can work with clients from very early stages of investment consideration.

Being able to sit with a client and go through a range of scenarios and have answers within minutes is a revolution in the cost management industry. The first client AECOM demonstrated this to was a multi national in the oil and gas sector with projects located across the globe. They have since signed off on a pilot project to secure their own cost information through the same process and have direct access to the GUIDE reports and parametric model. Finally, the aesthetic appeal of the apps themselves needed to be considered. This was achieved through the engagement of AECOM's internal graphic design team to iteratively design the look and navigation of the system.

AECOM decided to utilise UniPhi's project management and software development expertise as well as the close working relationship that had been developed throughout the Global Unite project to develop a new product called GUIDE.

Initially, Global Unite was intended to provide streamlined processes for accessing benchmark data internally. However, the creation of GUIDE enabled AECOM to present this information to clients in informal and formal meetings either via the tablet or via the web application.

This was a revelation and led to many clients with a large capital portfolio and internal cost data to ask if they could access their own cost information in the same easily accessible way. The desire to allow access by major clients encouraged the AECOM IT team, in collaboration with UniPhi, to establish an efficient and yet secure process that provides end users with the information they need, where and when they need it.

The true innovation of the GUIDE product is that it unlocks the wealth of information that has been captured globally by AECOM cost professionals and makes this information accessible to anyone who is interested in it in a confidential and secure manner.

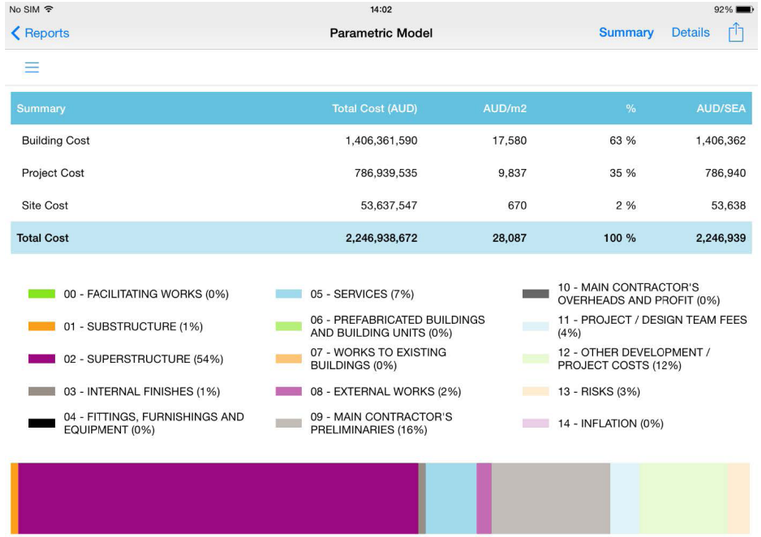
GUIDE has brought the benchmark information captured via Global Unite to life. This means that the motivation for employees to follow the Global Unite process and import the cost plans into the data warehouse has increased to the point where it is now self-sustaining. The number of cost plans being captured has increased by 50 percent to more than 200 per month globally since GUIDE was released.

The performance of the app from an IT perspective has been very impressive. Reports return results in seconds and estimates can be completed in less than a minute. The speed and accuracy of the information has garnered great enthusiasm internally at AECOM to use the product and we are now showing it to all relevant clients.

With cost consultancy being challenged from a range of technological advancements around BIM, the GUIDE application has given AECOM's cost consultants an edge that allows them to be ahead of the game and engage with clients at the earliest possible stage of the project planning process.

The following section provides example outputs from GUIDE and Global Unite.

FIGURE 37. IPAD SUMMARY OUTPUT OF A PARAMETRIC COST ESTIMATE



Summary	Total Cost (AUD)	AUD/m2	%	AUD/SEA
Building Cost	1,406,361,590	17,580	63 %	1,406,362
Project Cost	786,939,535	9,837	35 %	786,940
Site Cost	53,637,547	670	2 %	53,638
Total Cost	**2,246,938,672**	**28,087**	**100 %**	**2,246,939**

FIGURE 38. CHANGE IN PARAMETERS — IPAD DETAILED OUTPUT FROM A PARAMETRIC COST ESTIMATE WITH THE ABILITY TO TWEAK THE PARAMETERS VIA A SLIDER WITHIN THE APPLICATION

No SIM 14:02 91%

Reports | Parametric Model | Summary | Details

Element	Driver	Elemental Qty	Elemental Unit	Elemental Rate (AUD)	Elemental Total (AUD)	AUD/m2	# Projects
02.03 - Roof		80,000	m2	143	11,469,873	143	25
02.04 - Stairs and Ramps		80,000	nr	83	6,604,602	83	22
02.05 - External Walls	External Wall (incl Windows) : Floor 0 2 6	160,000	m2	6,428	1,028,512,590	12,856	26
02.06 - Windows and External Doors	Windows : Floor 0 1 3	80,000	nr	68	5,438,156	68	22
02.07 - Internal Walls and Partitions	Internal Wall : Floor 0 1 3	80,000	m2	1,185	94,782,353	1,185	23
02.08 - Internal Doors	Internal Doors : Floor 0 1 3	80,000	nr	587	46,927,811	587	22
03 - INTERNAL FINISHES					**19,047,441**	**238**	**25**

FIGURE 39. BENCHMARK COST RATES VS AREA — BEST FIT RELATIONSHIP BETWEEN THE COST OF ELEMENT (E.G. FLOORS) AND THE SIZE OF THE BUILDING

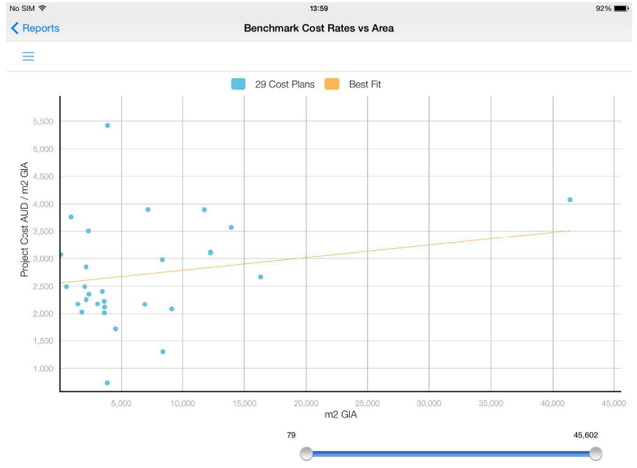


FIGURE 40. AVERAGE ELEMENTAL COST RATE BY ASSET TYPE

No SIM 13:59 92%

Reports | Average Elemental Cost AUD / m2 GIA By Asset Type

		00	00.01	00.02
Asset Type	**Count**	**FACILITATING WORKS**	**Toxic / Hazardous Material Removal**	**Major Demolition Works**
01 Commercial - 01.1 Business Parks				
01.1 Business park offices	26	5.57	0.06	21.56
09 Shops	1	0.00	0.00	0.00
Not Specified	1	145.80	0.00	0.00
01 Commercial - 01.4 Offices				
01.2 Data centres and computer facilities	1	0.00	0.00	0.00
01.4 Office 01-03 storeys low rise	34	42.12	0.23	0.00
01.4 Office 04-15 storeys medium rise	65	88.33	31.95	124.26
01.4 Office 16-30 storeys high rise	2	53.65	0.00	53.65
01.4 Service buildings	1	0.00	0.00	0.00
05.4 Laboratories	1	0.00	0.00	0.00
05 Healthcare - 05.2 Private Healthcare				
05.2 Clinics	1	0.00	0.00	0.00
05.2 Hospitals	1	0.00	0.00	0.00
05.3 Day centres / hospitals / nurseries	1	97.57	0.00	97.57

FIGURE 41. ELEMENTAL COST BREAKDOWN — AVERAGE, MINIMUM AND MAXIMUM COST RATES BASED OFF A METRIC

No SIM 14:01 92%

Reports | Elemental Cost Breakdown AUD / m2 GIA

	01 Commercial - 01.1 Business Parks	Average (AUD)	Minimum (AUD)	Maximum (AUD)
00	**FACILITATING WORKS**	**19.88**	**0.06**	**145.80**
00.01	Toxic / Hazardous Material Removal	0.06	0.06	0.06
00.02	Major Demolition Works	21.56	5.08	144.27
01	**SUBSTRUCTURE**	**157.49**	**33.55**	**522.83**
01.01	Foundations	157.49	33.55	522.83
02	**SUPERSTRUCTURE**	**1,099.76**	**293.11**	**2,663.21**
02.01	Frame	224.84	60.29	805.41
02.02	Upper Floors	143.73	9.30	389.79
02.03	Roof	145.31	43.40	321.65

Section

THREE

Reference Articles

Procurement routes

All clients expect buildings to be on time and budget with an agreed level of quality, with the risk rightly managed by their professional and contracting team. However, most clients and construction professionals can name at least one project that was not delivered to budget, time or the quality levels expected. This is why the right procurement strategy, one that balances risk and control against the competing project objectives of cost, time and quality, is key to a successful project outcome.

AECOM has developed strategies for the delivery of buildings that we know work, successfully delivering hundreds of projects over our long history. New and existing developers have the opportunity to learn from this knowledge and maximise the value from their time, cost and quality mix, whilst adhering to a process that increases the likelihood of their building being successfully procured by their team involved.

Studies conducted with our key clients who regularly undertake development work, have shown that buildings can be delivered for 12-15 percent less cost when procured correctly with no impact on quality or time. Buildings are more likely to be on time and meet clients' expectations when procured correctly. So what is the right procurement approach for your building? Which funding strategy, funding partner, team behaviours, attitudes, communication channels, budget and programme delivers the best approach and how can we best combine these to lead our clients to ultimate success?

AECOM offers important early advice to help determine the right procurement approach, adding value throughout the building process. This considered understanding of our clients' time, cost and quality requirements maximises the value we can offer. Some of the procurement strategies followed in the industry are listed below, but the real challenge is mixing the right approach for an individual client's needs:

Traditional lump sum: The design by the client's consultants is completed before contractors tender for and then carry out the construction. The contractor commits to a lump sum price and a completion date prior to appointment. The contractor assumes responsibility for the financial and program risks for the carrying out of the building works, whilst the client takes responsibility and accepts the risk for the quality of the design and the design team's performance. The client's consultant administers the contract and advises on aspects associated with design, progress and stage payments which must be paid by the client.

Accelerated traditional: As above, but procured in the market place before being fully designed (normally 80-85 percent designed), leaving more simple elements of the building to be procured once the contractor has been appointed. It is important to understand the way in which a client procures the remaining elements of work with a contractor under this approach and to design out those areas that carry inherent risk early in the process. It may also involve the procurement of an early works package for enabling and/or piling works.

Two stage: A contractor is invited to become part of the project team in stage one, usually by way of a preconstruction fee. They design and procure the project on behalf of the client, until such time that a second stage lump sum offer can be agreed, which should be before construction begins on site. An understanding of the original appointment and the subsequent framework under which the second stage is agreed, are the important aspects of this approach, as well as working with transparency and trust preventing an early commitment to a full scheme that a client cannot afford.

Design and build: Detailed design and construction are both undertaken by a single contractor in return for a lump sum price. There are variants on this option depending on the degree to which initial design is included in the client's requirements. Where a concept design is prepared by a design team employed directly by the client before the contractor is appointed (as is normally the case), the strategy is called develop and construct. The contractor commits to a lump sum price, for completion of the design and the construction to a completion date, prior to his appointment. The contractor can either use the client's design team to complete the design or use his own team. With design and build it is important to design out or specify in detail those parts of the building the client wants to see perform a particular function or provide a particular visual impact.

Management contract: Design by the client's consultants generally overlaps with the construction. A management contractor is appointed early to tender and let elements of work progressively to subcontractors and specialists in work packages. The contracts are between the management contractor and the trade contractors, rather than between the client and sub-contractors. The management contractor will not carry out construction work, but is employed to manage the process. The management contractor in theory assumes responsibility for the financial (and program) risks for the works, but in reality this is normally diluted by the terms of the contract so his liability is similar to that of a construction manager.

Design, manage and construct: similar to the management contract, with the contractor also being responsible for the production of the detailed design or for managing the detailed design process.

'Turnkey' contract: A form of a design and build contract, in which a single contractor or developer is responsible for all services, including finance. Under a turnkey project, the client enters into a contract with one party to deliver the entire project. The project is handed over once it is completed and fully operational. The client is normally not involved in any of the decisions throughout the building process. There are several variations of 'turnkey' contracts, including Engineer-Procure-Construct (EPC), Build-Own-Lease-Transfer (BOLR), Design-Build-Operate-Transfer (DBOT).

Private finance: A detailed and complicated form of procurement used predominantly for public services when the private sector feels it is advantageous to design, build, finance and operate a particular service or building type. It is becoming more popular in the Middle East as a way to limit public sector spending whilst meeting the demands of a growing population.

Middle East Forms of Contract

This article considers the different forms of contract used in construction across the region.

BAHRAIN

Government work in the Bahrain is undertaken using a bespoke suite of contract forms that were issued in 2009.

Private developers predominantly use the current FIDIC Conditions of Contract for Construction, the 1999 edition of the 'red book', which is well understood in the local market but often heavily amended for specific use. Most of the work completed in Bahrain is under a traditional lump sum form of contract, where the design is completed upfront and a price agreed with a contractor before work begins on site.

Design and build and two-stage procurement are in use across the Kingdom but are not considered to be the industry norm. As more international private developers have started working in Bahrain with time constraints as their main driver, the market has adjusted to accommodate this demand. Design and build contracts, however, are not routine. This is largely due to the Committee for Organising Engineering Professional Practice (COEPP) restrictions on contractors undertaking in-house design that necessitates the novation of the client's architect or a sub consultant appointment.

KINGDOM OF SAUDI ARABIA

Construction contracts in the private sector are generally based on FIDIC forms of contract and are amended to suit the particular conditions for each project. Employers prefer lump sum versus remeasured contracts and normally exercise great control in the administration of the construction process by imposing various restrictions on the engineer's (consultant) authorities under the contract. All contracts are subject to Saudi laws where Islamic Sharia is the prime source of legislation. Litigation and arbitration are both available for resolution of disputes in the private sector.

Within the public sector, however, construction contracts are based on the Standard Conditions for Public Works, which are amended to suit particular projects. These conditions are generally based on those given in the 4th edition of the FIDIC Conditions of Contract for Works of Civil Engineering Construction, the FIDIC 4 'red book', but with greater control given to the employer for the administration of the contract. All public work contracts are let on remeasured basis and subject to the Saudi Government Tendering and Procurement Regulations.

OMAN

Public works in Oman are undertaken using a bespoke government contract known as the Standard Documents for Building and Civil Engineering Works, 4th edition, 1999. The document is based on early FIDIC contracts with the 4th edition containing only minor changes from the previous 3rd edition, 1981. The most important change is that the contract is now printed in Arabic. The Ministry of Legal Affairs is in the process of preparing a new edition but its launch date is yet to be published.

The Standard Document facilitates both a remeasurement and lump-sum contract dependent on a choice of clauses, and is based upon a fully completed design, specification and bill of quantities. The RICS Principles of Measurement (International) are the most widely used method of measurement.

Infrastructure projects have their own method of measurement, as detailed within the Ministry of Transport and Communications document, Highway Design Standards. Oman Tender Board laws require all government projects to utilise the Standard Documents on every project, without amendment. In addition, the Tender Board facilitates all government tenders, centrally, through the tender board process. Only Royal Office and Royal Court of Affairs projects are exempt from this process although they do go through a similar internal tender process.

Standard Documents are commonly used by private sector clients in the local market, particularly for small-to-medium sized contracts. Private clients tend to prefer the 3rd edition as this is written in English, but varies only in a minor way from the Arabic 4th edition — preferred by the government ministries. International and private sector clients with large project contracts commonly use an amended version of the FIDIC "red book." Whilst some of the larger integrated tourism developments have used a design build form of contract, design and build as a procurement route is not routinely used.

QATAR

In Qatar the most common forms for building works are those issued by the Public Works departments through the Ministry of Municipal Affairs and Agriculture (MMAA) and the Qatar Petroleum Company (QP). These are lump sum contracts, generally using bills of quantities or specifications and drawings.

In the private sector, similar contractual arrangements are adopted. However, there are now some construction projects being let using cost plus or design and build arrangements, although these are usually for smaller scale fitting out or highly specialist works.

The market has seen an increase in the number of FIDIC based contracts being implemented for both private and key public sector clients. In addition, in some very long duration contracts, the government is beginning to introduce a price adjustment mechanism to allow compensation for fluctuations in market prices.

Before any contract is awarded, there are commonly a number of rounds of negotiation, during which the price and other contractual terms can be modified to respond to a reduction in contract price.

UAE

Construction contracts in the UAE are predominantly based upon the FIDIC forms of contract. The growing number of large scale developers and major repeat clients in the region has led to the development of bespoke forms of contract, tailored to each individual client. Such contracts generally use the FIDIC 4 'red book' form as a basis, amended to a greater or lesser degree depending upon the risk profile of each client. This also applies to works procured by Dubai Municipality. Abu Dhabi Municipality, however, bases its contract on a modified FIDIC 3 form, taken from the 3rd edition of the FIDIC Conditions of Contract for Works of Civil Engineering Construction.

Contracts based on the 1999 'red book' are now starting to be used in the UAE, but in general the market remains firmly rooted in the FIDIC 4 form.

Civil works contracts within the UAE are mostly procured on a remeasurable basis, whereas building works will generally be based on a fixed-price lump sum.

Building regulations and compliance

This section outlines the procedures for obtaining building permission across the region.

BAHRAIN

Procuring a municipal building permit in Bahrain is done through a three-stage process:

Stage 1: Seeking the preliminary building permit
This is preliminary permission sought from the Municipality of Bahrain. To complete the application it is generally sufficient to include simple outline plans, cross-sections to indicate overall heights and an area statement. The main authorities involved at this stage are the Municipality, the Physical Planning Directorate and the Roads Directorate.

Stage 2: Informing the various directorates
This should be done in writing to the Town & Village Planning Directorate, Roads Directorate, the Civil Defence and Fire Services Directorate, the Electricity Distribution Directorate (EDD), EDD Damage Protection and Control Unit, the Sanitary Engineering Operations and Maintenance Directorate, the Water Distribution Directorate and Batelco. The initial contact should be made through the Central Planning Office (CPO) of the Ministry of Works.

Copies of the Title Deeds must be submitted at this stage. All relevant information and documentation is given to each of the above Directorates, until the final Building Permit is in hand.

Stage 3: Obtaining the final municipal building permit
This is the third and last stage and is processed through each of the Directorates in specific sequence. The initial contact should be made through the Municipality One Stop Shop. All documents, drawings and Municipality forms must be filled in and submitted together with the appropriate fees for each Directorate.

KINGDOM OF SAUDI ARABIA

Obtaining a building permit in the Kingdom of Saudi Arabia varies from region to region, however they tend to follow the same basic principles. The various procedures and approvals from the main municipality, the branch municipality and the fire department need to be obtained.

The following is a general outline of the steps needed to obtain a Building Permit:

Stage 1: Obtaining letter from the main municipality
A letter from the owner is submitted to the main Riyadh Municipality, along with a copy of the land deed. The Municipality checks the masterplan of the area to ensure the suitability of the plot for the construction of a building. The Municipality then writes a letter to the Branch Municipality of the area where the plot is located.

Stage 2: Obtaining preliminary location permit from branch municipality
The owner submits a copy of the letter obtained previously from the Main Municipality to the Branch Municipality, requesting an inspection of the plot to ensure that the plot length, width and total area are as indicated on the deed. The Branch Municipality then issues an approval to use the land.

Stage 3: Obtaining approval from the fire department
The Branch Municipality writes to the Fire Department, or Civil Defence, to obtain its approval of the plan submitted by the owner for the fire-alarm and fire-fighting systems. The Fire Department approves these plans and sends them back to the Municipality.

Stage 4: Obtaining a final building permit
The Branch Municipality issues a Building Permit and sends it to the Main Municipality for approval, which is given dependent on the nature of the building. The owner can collect the Permit from the Main Municipality after one to three months.

OMAN

The following is a general outline of the procedure for obtaining a building permit in the Sultanate of Oman but there are many further obligations and procedures to be completed within each of the stages. It is generally the responsibility of the lead consultant to obtain the building permit, although all applications must be signed off and submitted by locally registered consultants.

Stage 1: Submitting concept design/ masterplan stage application
The applicant submits a Concept Design/Masterplan application to the Ministry of Housing - Directorate General of Planning for approval of the proposed usage. At the same time utility requirements are identified and indicated to the relevant utility providers. If the project is tourism related, further approvals are required from the Ministry of Tourism and the Supreme Committee for Town Planning.

Stage 2: Obtaining No Objection Certificates (NOCs)
No Objection Certificates are obtained from various governmental and municipal departments, including, Royal Oman Police, Security Department, Traffic Department and Civil Defence, Ministry of Environment, Municipality Road Department, Ministry of Transport & Communications, Civil Aviation, and many more project-specific ministry departments, e.g. Ministry of Education if the project is a school or university.

Stage 3: Submitting a building permit application
The full building permit application, including all NOCs, is submitted to the relevant municipality or statutory authority.

Stage 4: Obtaining building occupancy certificate
Upon completion of the building works, it is the responsibility of the construction contractor or lead consultant to obtain the occupancy permit. This is achieved by having the building permit signed off, effectively closing it out. To obtain this closure, the contractor must obtain certificates and signatures from various government departments, including Civil Defence, Food and Hygiene, etc, prior to presenting these to the municipality or statutory authority for final approval.

QATAR

Compared with many countries, the planning and building approval process in Qatar is relatively clear and structured.

Land ownership, other than by Qatari nationals and the state, is still extremely limited. The key process in securing development rights is obtaining a land title or 'pin' number; without it all other permits and applications cannot commence. Once the land is secured, the project masterplan is submitted for approval to the Planning Department and local Municipality offices.

Stage 1: DC1 approval
General overviews and strategies for the utilities and primary infrastructure are submitted to the relevant utility companies for comment. During this process each department generally issues a series of reference numbers that are then used as the file number for all future submissions. The culmination of this round of submissions is the DC1 approval.

Stage 2: DC2 approval
As the design develops, a second round of submissions is made to the same utility departments for final approval. In addition, a submission is made to the Civil Defence department who review the fire and life safety aspects of the project.

Depending upon the scale and nature of the project, separate traffic studies may be required and these would be submitted to the Road Affairs Department for approval.

Stage 3: Building permit
Once the DC2 approval is secured a further set of standard forms are circulated with a consolidated set of documents for final signing and approval. These documents constitute the Building Permit.

All submissions have to be either in Arabic or bilingual and endorsed by locally registered and approved design companies. International companies cannot make these submissions by themselves.

Recently a number of revisions have been made to the design standards of buildings, in particular high rise structures. These address issues such as fire safety, refuge areas, the use of lifts in the event of fire, and the nature and extent of façade glazing.

All fit-out projects are being brought under the control of the regulatory departments, in particular Civil Defence. All such works are now required to be submitted for approval prior to commencement. This submission must be made by a registered local consultant and failure to do this can significantly delay the approval and permitting process.

UAE

The following is a general outline of the procedure for obtaining a Building Permit in the UAE, but there are many further obligations and procedures to be completed within each of the stages. Building Permit application Stage 3, for example, requires no less than 15 different forms, documents and separate approvals to be submitted as part of the application.

It is the responsibility of the construction contractor or lead consultant to obtain the Building Permit, although all applications must be signed by locally registered consultants.

Stage 1: Submitting preliminary application
The applicant submits a preliminary application to the relevant municipality or statutory authority and pays a deposit.

Stage 2: Obtaining No Objection Certificates
No Objection Certificates (NOCs) are obtained from various governmental and municipal departments including Civil Defence, Fire Department, Drainage, Communication, Water and Electricity, Civil Aviation, Oil and Gas, Coastal and Military.

Stage 3: Submitting building permit application
The full Building Permit application, including all NOCs, is submitted to the relevant municipality or statutory authority.

Stage 4: Obtaining building permit
On approval, the applicant collects the Building Permit and applies for a Demarcation Certificate.

Stage 5: Obtaining building occupancy certificate
Upon completion of the building works, it is the responsibility of the construction contractor or lead consultant to obtain the Occupancy Permit. This is achieved by having the Building Permit signed off, effectively closing it out. To obtain this closure the contractor must obtain certificates and signatures from various government and quasi-government departments, including Civil Defence, Food and Hygiene and CID, prior to presenting these to the Municipality or statutory authority for final approval.

Section

FOUR

Reference Data

International Building Cost Comparison

The international cost data shown is a comparison of local construction costs converted to US Dollars to enable comparison. The building costs for the respective asset types are averages based on local specifications. The actual cost of a building will depend, among other things, on unique site conditions, design attributes and applicable tariffs. In addition, the standard for each building varies from region to region, which may have a significant impact on costs.

Costs are subject to considerable variations due to factors such as:

- Local market conditions
- Exchange rates
- Commodity price movements
- Building specifications

The impact of exchange rate movements over the past year has been major. The deep depreciation of the Euro and many emerging market currencies compared to the US Dollar have led to a sharp relative fall in costs in these regions in US Dollar terms. In addition, diverging market conditions have affected relative costs over the past year, with the U.S. and the U.K. the notable outperformers where strength of the US Dollar, the Sterling and accelerated construction inflation have increased costs over the past year. In contrast, subdued activity in the Eurozone, Russia and major emerging countries, coupled with weak currencies have made these locations relatively cheaper in US Dollar terms.

HOW ARE GLOBAL MARKETS COMPARING

U.S.

The U.S. construction sector has seen steady growth over the last few years, a trend that is expected to continue. However, natural resource-related construction activity has stalled on the back of plummeting oil prices, which have resulted in projects being put on hold. Increased work volume has led to construction inflation running ahead of inflation in the wider economy.

Asia

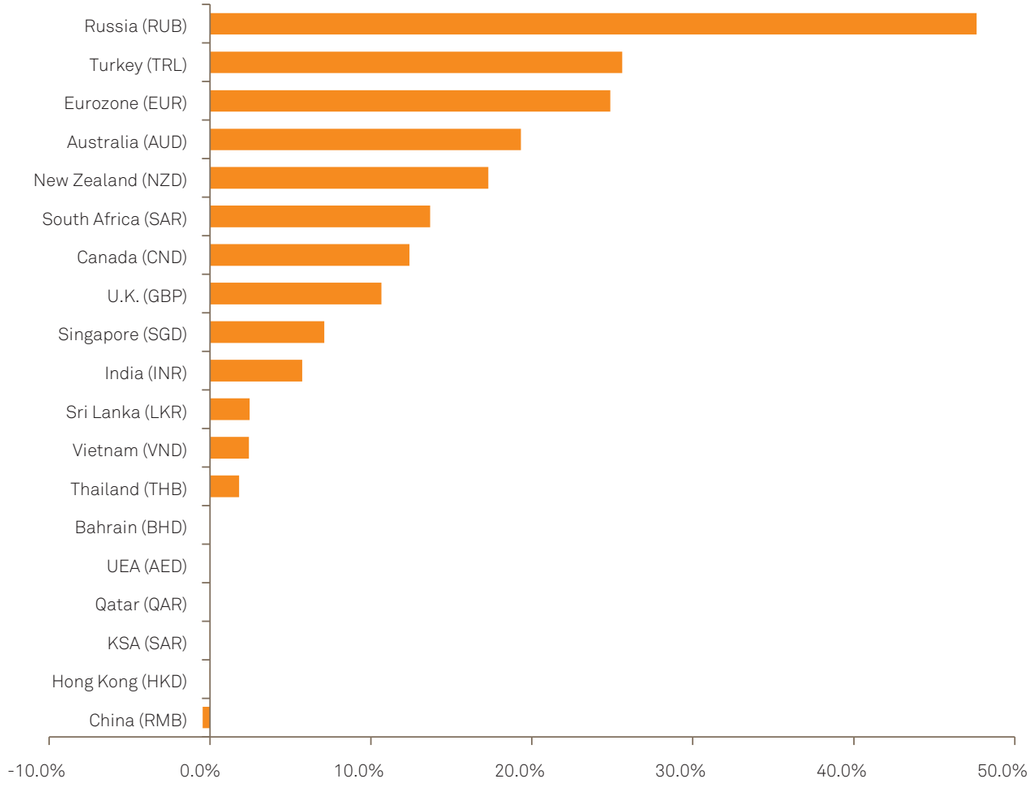
Construction activity in Singapore, measured as the value of contracts awarded at the start of 2015, together with lower material prices led to a decline in construction costs.

Construction cost inflation in Hong Kong continues to outpace other markets, making the city one of the most expensive cities to build in the world. While material, labor, plant and contractor overheads all contribute to the rise in cost inflation, a significant portion of price rises can be attributed to changes in regulations and consumer requirements.

China's construction and infrastructure sector growth is facing a structural slowdown in line with the economy's growth heading for a 'new normal'. Nevertheless, some sectors, including transport, are expected to continue to see strong investments on the back of government initiatives to improve connectivity. In line with slower industry growth and lower material prices, construction costs have declined recently, a trend that is likely to continue.

FIGURE 42. EXCHANGE RATE TRENDS

Currency movements of the US Dollar against major currencies Q2 2015 compared to Q2 2014



Source: Bank of England, www.xe.com

Middle East

The impact of lower oil revenues is keenly felt in the oil-exporting Middle East countries. Public sector spending plans appear to be reassessed in light of a potentially longer than expected period of low oil prices. In the U.A.E., the pick-up in construction activity seen over the past 18 months appears to have taken pause for breath as project owners and the construction supply chain reassess market fundamentals that will test the industry's resilience over the course of the year. At the same time, tender prices continue to rise, albeit at a relatively moderate pace, with price changes likely to be due to contractor capacity constraints rather than buoyant demand and input cost pressures.

U.K.

Firm sentiment, coupled with strong output demand has stretched the construction industry across the supply chain over the past year, with increased tender prices triggered by capacity constraints. Tender price increases are particularly strong in Greater London, but also in some of the regions. Rates of tender price increases are almost the same now as those experienced in 2007/08.

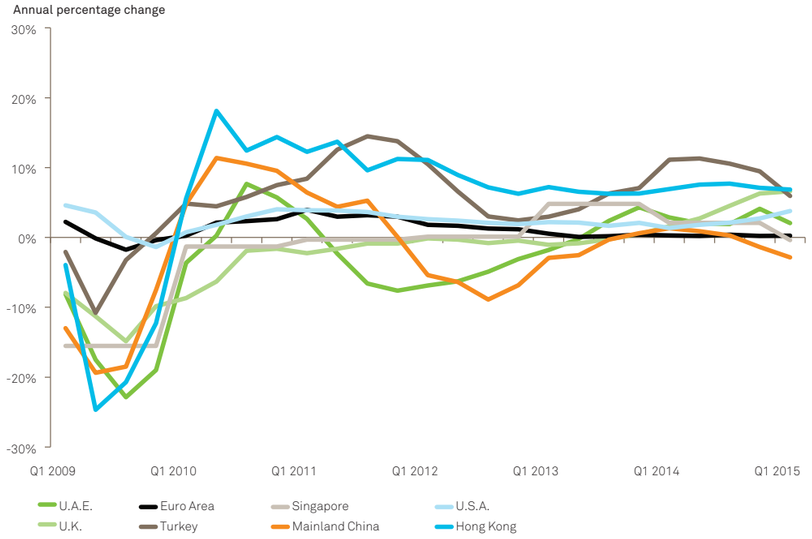
Eurozone

The slow pace of construction industry activity in Europe lasted longer than in other sectors. Nevertheless, a recovery is now taking place after seven years of crisis and stagnation. Good prospects for the European economy will be driven by investments. Growth rate of construction in 2015-2017 will exceed the GDP growth.

Australia

On the back of subdued business conditions, global volatility and muted demand, activity in Australia's building construction industry is patchy. The outlook for construction cost escalation is modest in most cities, with the exception of Sydney where a combination of significant size projects and strengthening demand is keeping many contractors busy. Elsewhere competition levels are high, and while the easing dollar will push up prices on imported plant and materials, pressure to win work will keep tender prices in check.

FIGURE 43. INTERNATIONAL CONSTRUCTION COST INFLATION

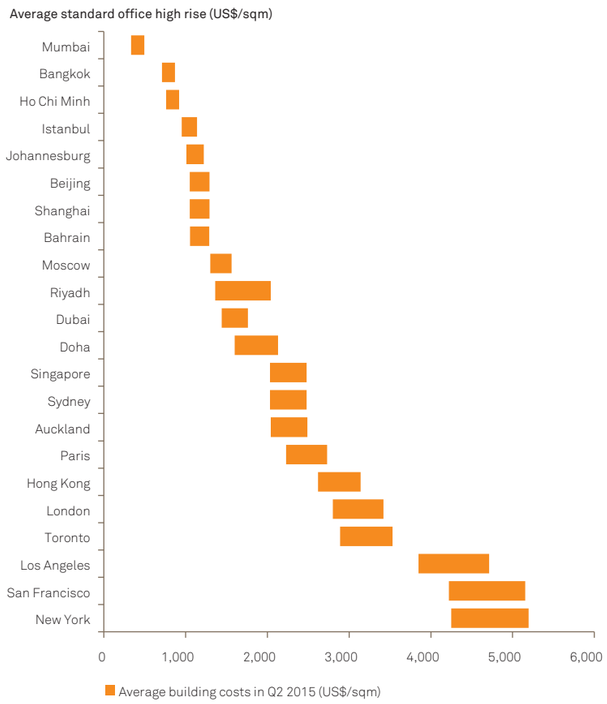


Source: Based on AECOM Indices for UK, UAE; ENR USA Building Cost Index; NBS Mainland China Construction + Installation Price Index, Singapore Building Construction Authority, Hong Kong Building Works Tender Price Index, Eurostats Euro Area and Turkey Con

FIGURE 44. RESIDENTIAL

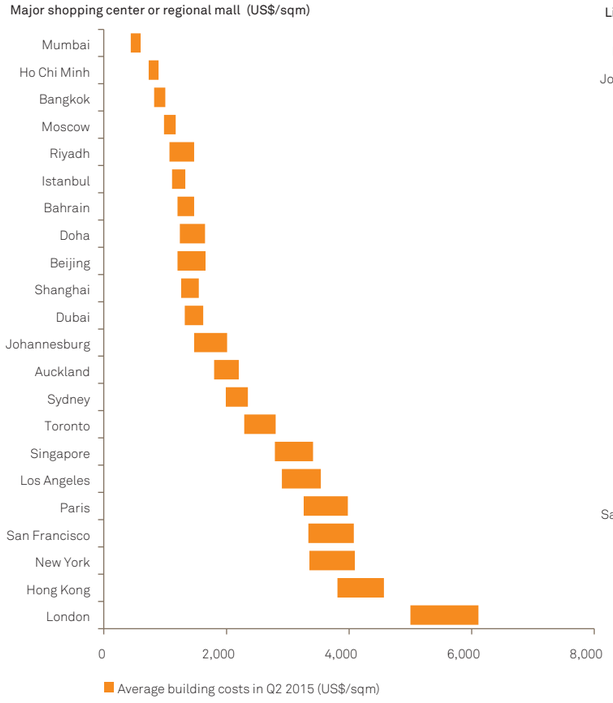
Source: AECOM
USD per square meter
Note: Relative building costs based on Q1 2015, foreign exchanges rates as of Q1 2015 average.
Cities ordered by residential average standard high rise.

FIGURE 45. COMMERCIAL — OFFICES



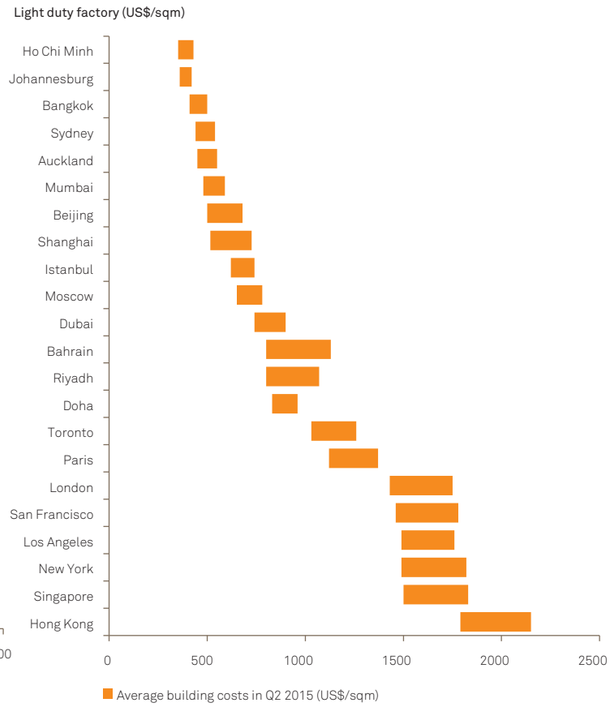
Source: AECOM
USD per square meter
Note: Relative building costs based on Q1 2015, foreign exchanges rates as of Q1 2015 average.
Cities ordered by average office high rise

FIGURE 46. COMMERCIAL — RETAIL



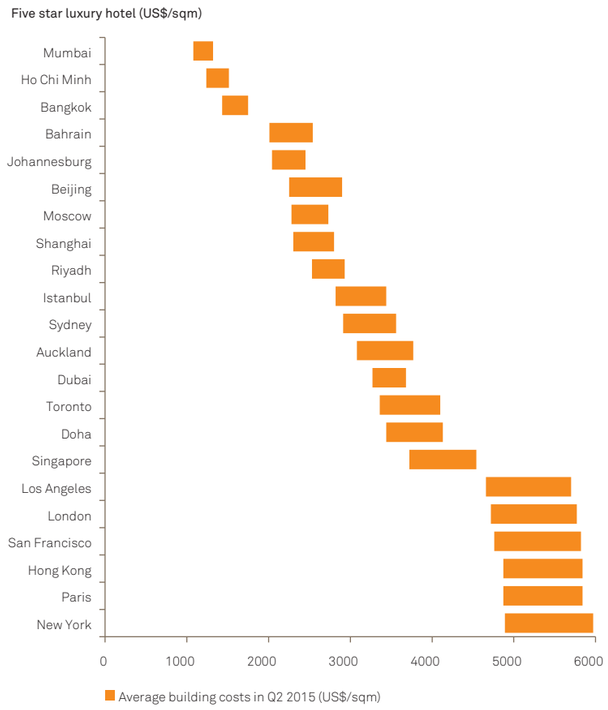
Source: AECOM
USD per square meter
Note: Relative building costs based on Q1 2015, foreign exchanges rates as of Q1 2015 average.
Cities ordered by average major shopping center or regional mall

FIGURE 47. INDUSTRIAL



Source: AECOM
USD per square meter
Note: Relative building costs based on Q1 2015, foreign exchanges rates as of Q1 2015 average.
Cities ordered by average light duty factory

FIGURE 48. TOURISM



Source: AECOM
USD per square meter
Note: Relative building costs based on Q1 2015, foreign exchanges rates as of Q1 2015 average.
Cities ordered by average 5 Star Luxury Hotel

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Regional Building Cost Comparison

Building cost (US$/sqm)		U.A.E. (Dubai)		K.S.A. (Riyadh)		Qatar (Doha)		Bahrain (Manama)		Oman (Muscat)	
Sectors	Typology	Low	High	Low	High	Low	High	Low	High	Low	High
Residential	Low rise	950	1,500	800	1,330	1,240	1,510	670	1,070	780	910
	Medium rise	1,230	1,500	1,200	1,470	1,380	1,790	1,070	1,470	910	1,170
	High rise	1,500	2,310	1,600	2,000	1,510	1,930	1,340	1,740	N/A	N/A
Commercial	Low rise office (shell & core)	1,090	1,360	670	1,200	1,240	1,510	1,070	1,470	N/A	N/A
	Mid rise office (shell & core)	1,230	1,500	1,200	1,600	1,380	1,790	1,340	1,610	650	910
	High rise office (shell & core)	1,360	2,040	1,600	2,130	1,790	2,200	1,470	2,010	N/A	N/A
	Fit-out — basis	1,090	1,500	670	930	550	690	540	740	N/A	N/A
	Fit-out — medium	1,500	1,910	930	1,200	960	1,240	670	940	N/A	N/A
	Fit-out — high	1,910	2,450	1,200	1,600	1,240	1,790	870	1,340	N/A	N/A
Retail	Community	1,270	1,550	670	930	1,100	1,380	1,070	1,340	1,250	1,510
	Regional mall	1,320	1,620	1,070	1,470	1,240	1,650	1,200	1,470	1,240	1,550
	Super regional mall	1,470	1,800	1,200	1,730	1,240	1,790	1,340	1,740	1,350	1,660
Industrial	Light duty factory	740	900	800	1,070	830	960	800	1,130	700	900
	Heavy duty factory	860	1,050	800	1,070	960	1,240	940	1,300	890	1,150
	Light industrial unit	610	750	670	800	690	830	670	940	N/A	N/A
	Data center — tier 3 *based on USD/kW(IT)	19,060	21,780	18,140	20,810	19,820	22,570	N/A	N/A	N/A	N/A
Hotel	Budget	1,770	2,180	1,330	1,600	2,340	2,480	1,470	1,740	N/A	N/A
	Mid-market	2,180	2,720	1,600	2,130	2,480	3,440	1,610	2,140	2,570	3,440
	Up market	3,270	3,680	2,530	2,930	3,440	4,130	2,010	2,540	2,880	3,610
	Resort	3,130	3,810	2,930	3,470	3,850	4,130	2,410	3,210	3,070	3,950
Car parks	Multi storey	520	650	590	720	760	890	400	670	340	520
	Basement	760	930	800	930	830	960	600	940	N/A	N/A
Other	Schools — primary, secondary academy	1,310	1,630	800	1,330	1,510	2,060	1,340	1,740	1,170	1,510
	Healthcare — district hospital	2,590	3,130	1,870	2,670	2,200	2,750	2,410	2,940	2,090	2,680
Exchange rate to 1 US$		AED	3.67	SAR	3.75	QAR	3.63	BHD	0.37	OMR	0.38

Note: All costs are based on Q2 2015. For typology definitions, inclusions and exclusions see "Basis of Construction Costs" on page 96. Relative cost of construction is based on typical build costs in USD. Influence of foreign exchange fluctuations, unique site conditions, design attributes and applicable tariffs must be considered when comparing actual projects. Relative costs are based on an average across all sectors.

Mechanical & Electrical Cost Comparison

Building cost (US$/sqm)		U.A.E. (Dubai)		K.S.A. (Riyadh)		Qatar (Doha)		Bahrain (Manama)		Oman (Muscat)	
Typology		Low	High	Low	High	Low	High	Low	High	Low	High
Residential	Low rise	270	350	280	470	370	450	230	360	700	900
	Medium rise	350	450	420	510	410	540	360	500	340	470
	High rise	560	730	640	800	520	670	540	700	N/A	N/A
Commercial	Low rise office (shell & core)	350	420	200	360	370	450	370	510	N/A	N/A
	Mid rise office (shell & core)	400	480	360	480	410	540	470	560	260	420
	High rise office (shell & core)	450	550	560	850	520	770	660	900	N/A	N/A
	Fit-out — basis	350	480	200	280	60	70	240	330	N/A	N/A
	Fit-out — medium	480	620	280	360	190	250	300	420	N/A	N/A
	Fit-out — high	620	790	420	560	440	630	390	600	N/A	N/A
Retail	Community	350	420	230	330	390	450	360	450	N/A	N/A
	Regional mall	410	530	370	510	440	580	410	500	410	520
	Super regional mall	430	560	480	690	440	720	450	590	N/A	N/A
Industrial	Light duty factory	240	290	240	320	250	290	540	740	290	370
	Heavy duty factory	340	410	240	320	290	370	670	940	390	500
	Light industrial unit	150	180	200	240	210	250	330	470	N/A	N/A
	Data center — tier 3 *based on USD/kW(IT)	14,010	16,010	13,340	15,470	15,140	17,340	N/A	N/A	N/A	N/A
Hotel	Budget	430	530	530	640	820	990	470	560	N/A	N/A
	Mid market	530	670	640	850	990	1,380	510	680	820	1,100
	Up market	800	900	1,010	1,170	1,380	1,510	680	860	1,040	1,310
	Resort	770	930	1,170	1,390	1,380	1,510	750	1,090	1,520	1,960
Car parks	Multi storey	120	150	200	240	230	270	80	130	50	160
	Basement	190	210	240	280	330	390	180	280	N/A	N/A
Other	Schools — primary, secondary academy	510	640	280	470	610	830	370	490	330	420
	Healthcare — district hospital	1,140	1,380	750	1,200	720	1,240	1,160	1,410	N/A	N/A
Exchange rate to 1 US$		AED	3.67	SAR	3.75	QAR	3.63	BHD	0.37	OMR	0.38

Note: All costs are based on Q2 2015

Major Measured Unit Rates

Item (unit rates in US$)	Unit	Description	U.A.E. (Dubai)	K.S.A. (Riyadh)	Qatar (Doha)	Bahrain (Manama)	Oman (Muscat)
Excavation	m³	Standard/minimum specification Excavation for trench foundation; depth not excessive, i.e. no greater than 1-2 m	6.0	12.0	14.0	5.0	6.0
Disposal of excavated material	m³	Standard/minimum specification Disposal away from site	6.0	5.0	15.0	4.0	3.0
Filling	m³	Imported fill	7.0	8.0	18.0	11.0	11.0
Poured concrete, reinforced	m³	Standard/minimum specification Grade 20 or 30; superstructure, walls or slabs; reinforced	103	147	165	109	93
Reinforcement	tn	Standard/minimum specification 20mm bars	1,090	1,330	1,650	1,170	1,140
Formwork/shuttering	m²	Standard/minimum specification Superstructure standard; fair face finish to walls	35.0	37.0	33.0	13.0	18.0
Blockwork	m²	Standard/minimum specification 200mm solid blockwork, usually internal walls	38.0	48.0	50.0	25.0	22.0
Doors	no.	Standard/minimum specification Single leaf door, fire rated, timber, basic finish, usually 900mm wide, generally excluding ironmongery	930	1,070	960	570	1,220
Tiling to floors	m²	Standard/minimum specification 300 x 300mm ceramic tiles	37.0	53.0	69.0	28.0	39.0
Plaster to internal walls and ceilings	m²	12.5mm thickness	15.0	11.0	12.0	7.0	11.0
Painting to internal walls and ceilings	m²	Standard/minimum specification Emulsion	5.0	5.0	6.0	5.0	5.0
Exchange rate to 1 US$			AED	SAR	QAR	BHD	OMR
			3.67	3.75	3.63	0.37	0.38

Note: All costs are based on Q2 2015
Cost rates are indicative and represent supply only costs of the materials listed.
Location factors should be applied to address geographic variations in each country.
The rates are exclusive of VAT (Value Added Tax) or similar, where applicable.

Major Material Prices

Item	Description	Unit	U.A.E. (Dubai)	K.S.A. (Riyadh)	Qatar (Doha)	Bahrain (Manama)	Oman (Muscat)
			US$	US$	US$	US$	US$
Cement	Ordinary portland cement	Tonne	68	88	89	96	77
Sand	Sand for concreting	m³	14	31	30	21	12
Aggregate	19mm aggregate	m³	11	40	40	40	11
RMC	Grade 50 (OPC)	m³	71	79	124	94	77
	Grade 40 (OPC)	m³	65	73	117	86	67
	Grade 20 (OPC)	m³	54	63	110	83	58
Reinforcing steel	High tensile	Tonne	950	770	1,170	680	600
	Mild steel	Tonne	820	770	1,030	680	700
Hollow concrete blockwork	100mm thick	m²	5	9	10	9	7
	200mm thick	m²	6	12	11	10	7
Structural steelwork	Mild steel grade 50 to BS 4360	Tonne	1,090	1,600	1,790	960	1,590
Timber	Hardwood	m³	735	800	1,197	931	774
	Softwood	m³	245	467	798	300	306
Fuel	Diesel	Liter	0.9	0.1	0.3	0.3	0.4
	Petrol premium 95	Liter	0.5	0.2	0.3	0.3	0.3
Exchange rate to 1 US$			AED	SAR	QAR	BHD	OMR
			3.67	3.75	3.63	0.37	0.38

Note: All costs are based on Q2 2015
Cost rates are indicative and represent supply only costs of the materials listed.
Location factors should be applied to address geographic variations in each country.
The rates are exclusive of VAT (Value Added Tax) or similar, where applicable.

Labor Costs

Description	Unit	U.A.E. (Dubai)	K.S.A. (Riyadh)	Qatar (Doha)	Bahrain (Manama)	Oman (Muscat)
		US$	US$	US$	US$	US$
Skilled operatives						
Concreter	Hour	6	7	3	6	4
Steel fixer	Hour	6	7	3	6	4
Bricklayer	Hour	6	7	4	6	4
Carpenter	Hour	6	7	4	6	4
Mechanical installer	Hour	8	9	6	7	6
Electrician	Hour	9	9	7	8	5
Laborer (skilled)	Hour	5	5	3	5	4
Foreman	Hour	11	12	11	8	7
MEP foreman	Hour	12	15	12	7	7
Site engineer	Month	6,810	4,800	2,200	5,300	4,100
Construction manager	Month	10,890	13,870	4,130	11,240	6,860
Exchange rate to 1 US$		AED	SAR	QAR	BHD	OMR
		3.67	3.75	3.63	0.37	0.38

Note: All costs are based on Q2 2015
These rates (US$) are indicative and represent an all-in unit cost for each of the disciplines listed, and are

- inclusive of: wages, salaries and other remunerations prescribed by local labour legislation; average allowances for costs of employment; recruitment; visas/permits; paid leave; travel; accommodation; health and welfare
- exclusive of: overtime working; contractor mark-up for overheads and profit; VAT (Value Added Tax) or similar where applicable.

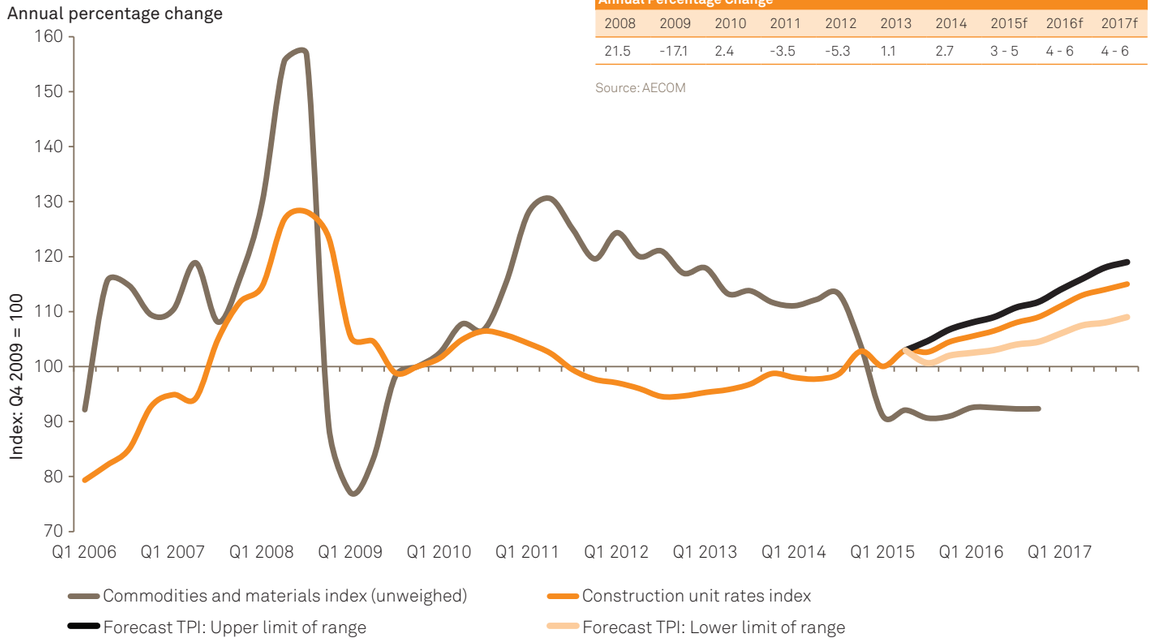
These rates should not be misinterpreted as contractors' daywork rates.

Middle East Indices

The U.A.E. Tender Price Index is AECOM's assessment of construction tender prices in the U.A.E. It is compiled by AECOM's Middle East Business Intelligence team based on actual returns of projects. It is based on new build and refurbishment projects across a variety of construction sectors and covers all of the U.A.E.

The Index is therefore a measure of average price changes across differing project types and locations. It should be regarded as a guide only when looking at any specific project, as the pricing of individual projects will vary depending on such factors as their complexity, location, timescale, etc.

FIGURE 49. AECOM UAE TENDER PRICE INFLATION INDEX AND FORECAST



Source: AECOM, IMF
Note: TPI Forecast is indicative only and is based on AECOM view as at July 2015. Material Price Index Forecast is indicative and based on IMF Forecasts as at April 2015. Forecasts are subject to chance without prior notice once new information is available

FIGURE 50. UAE TENDER PRICE INDEX

Annual Percentage Change									
2008	2009	2010	2011	2012	2013	2014	2015f	2016f	2017f
21.5	-17.1	2.4	-3.5	-5.3	1.1	2.7	3 - 5	4 - 6	4 - 6

Source: AECOM

Typical Building Services Standards for Offices

Subject	BCO (U.K.) specification 2009	Bahrain specification	U.A.E. specification*	Qatar specification	Oman specification
Net: gross ratio (typical)	80 - 85%	70 - 80%	75 - 80%	70 - 80%	70 - 80%
Occupancy standards — typical	1:8 - 1:13/m²	1:10 - 1:14/m²	1:10 - 1:15/m²	1:10 - 1:14/m²	1:10 - 1:15/m²
Occupancy standards — dealer	none stated	1:7 - 1:12/m²	1:7/m2	1:7 - 1:12/m²	1:7/m2
Occupancy standards — toilets	Single sex one person to 12m² using 60/60 male/female ratio based on 120% population.	Single sex one person to 12m² using 70/30 male/female ratio based on 120% population.	Single sex one person to 12m² using 70/30 male/female ratio based on 120% population.	Single sex one person to 12m² using 70/30 male/female ratio based on 120% population.	Single sex one person to 12m² using 70/30 male/female ratio based on 120% population.
Form of air conditioning	Fan Coil Units, VRV/ VRF, VAV, Displacement, Chilled Ceiling/Beam, Natural or mixed mode ventilation.	Fan Coil Units, VAV, DX, Constant Volume	Fan Coil Units, VAV, Downflow Units	Fan Coil Units, VAV, VAV with Re-Heat, DX, Constant Volume, plate heat exchangers	Fan Coil Units, VAV, Downflow Units
Heating and air conditioning internal criteria	24°C, +/- 2°C (Summer) 22°C, +/- 2°C (Winter)	22°C, +/- 1°C	22°C, +/- 2°C	22°C, +/- 2°C	22°C, +/- 2°C
Fresh air supplies	12 - 16 liters per second per person	10 liters per second per person	12 - 16 liters per second per person	12 - 16 liters per second per person	12 - 16 liters per second per person
Ventilation — WCs (extract)	none stated	12 air changes per hour	3 - 10 air changes per hour	10 air changes per hour	10 air changes per hour
Internal heat gains — lighting load	12 w/m²	15 w/m²	12 W/m²	12 - 15 W/m²	12 w/m²
Internal heat gains — equipment load (typical)	none stated	25 w/m²	15 W/m²	15 W/m²	15 w/m²
Internal heat gains — equipment load (dealer)	none stated	60 - 215 w/m²	45 W/m²	None	none stated
Supplementary cooling allowance (e.o./% area)	25w/m², 25%area)	None	25 W/m² to 25% area	None	none stated

Subject	BCO (U.K.) specification 2009	Bahrain specification	U.A.E. specification*	Qatar specification	Oman specification
Acoustics — offices	NR 35 - 40	NR 35	NR 30 - 35	NR 30 - 35	NR 30 - 35
Acoustics — common areas	NR 40 - 45	NR 40	NR 40 - 45	NR 40	NR 40
Primary power — lighting	12 w/m²	15 w/m²	12 W/m²	12 - 15 W/m²	12 - 15 W/m²
Primary power — typical	15 - 25 w/m²	35 w/m²	25 W/m²	30 - 40 W/m²	25 - 30 W/m²
Primary power — dealer	none	400, 800 or 1,500 w per desk	800 or 1,600 W / person	None	none stated
Primary power upgrade (e/o power/% area)	20 - 25w/m², 20 - 25% area.	None	25 W/m² to 25%area	None	none stated
Lighting — office	300 - 500lux, Uniformity Ratio 0.7	400 - 500lux	350 - 500lux, Uniformity Ratio 0.8	500lux	400 - 500lux, Uniformity Ratio 0.8
Lighting — stairs/circulation		200 - 270lux		250lux	200 - 270lux
Lighting — WCs		215lux		200lux	215lux
Lighting — plantrooms		215lux		150lux	215lux
Passenger lifts — capacity and waiting times	80% loading with 25 second waiting interval, handling 15% in five minutes. Population density 1:12	80% loading with 35 second waiting interval, handling capacity of 11% to 17% in five minutes. Population density 1:12	80% loading with 35 second waiting interval, handling 15% in five minutes. Population density 1:14	80% loading with 30 second waiting interval, handling 15% in five minutes. Population density 1:14	80% loading with 30 second waiting interval, handling 15% in five minutes. Population density 1:14

* Specific to the Emirate of Abu Dhabi (differing standards in the seven emirates).
Excludes implications of new building code regulations for the Emirate due to be come into effect at the beginning of the 2011.

Exchange Rates

1 US$ =	EUR Eurozone	GBP U.K.	INR India	RMB China	AED U.A.E.	SAR Saudi Arabia	QAR Qatar	OMR Oman	BHD Bahrain	KWD Kuwait	EGP Egypt	LBP Lebanon	JOD Jordan
Fixed					3.67	3.75	3.64	0.384	0.376				0.708
Jan-14	0.73	0.61	62.1	6.1						0.283	7.0	1503	
Feb-14	0.73	0.60	62.2	6.1						0.281	7.0	1504	
Mar-14	0.72	0.60	61.0	6.2						0.282	7.0	1503	
Apr-14	0.72	0.60	60.3	6.2						0.281	7.0	1509	
May-14	0.73	0.59	59.3	6.2						0.282	7.2	1512	
Jun-14	0.74	0.59	59.7	6.2						0.282	7.2	1512	
Jul-14	0.74	0.59	60.1	6.2						0.283	7.2	1513	
Aug-14	0.75	0.60	60.9	6.2						0.285	7.2	1513	
Sep-14	0.78	0.61	60.9	6.1						0.288	7.2	1513	
Oct-14	0.79	0.62	61.3	6.1						0.290	7.2	1513	
Nov-14	0.80	0.63	61.7	6.1						0.291	7.2	1513	
Dec-14	0.81	0.64	62.7	6.2						0.293	7.2	1512	
Jan-15	0.86	0.66	62.1	6.2						0.295	7.6	1511	
Feb-15	0.88	0.65	62.0	6.3						0.296	7.6	1509	
Mar-15	0.92	0.67	62.5	6.2						0.301	7.6	1514	
Apr-15	0.93	0.67	62.7	6.2						0.302	7.6	1507	
May-15	0.90	0.65	63.7	6.2						0.303	7.6	1508	

Source: Bank of England www.investing.com

Weights and Measures

METRIC MEASURES AND EQUIVALENTS

Length

1 millimeter (mm)	=	1 mm	=	0.0394 in
1 centimeter (cm)	=	10 mm	=	0.3937 in
1 meter (m)	=	100 cm	=	1.0936 yd
1 kilometer (km)	=	1000 m	=	0.6214 mile

Area

1 square centimeter (cm^2)	=	100 mm^2	=	0.1550 in^2
1 square meter (m^2)	=	10 000 cm^2	=	1.1960 yd^2
1 hectare (ha)	=	10 000 m^2	=	2.4711 acres
1 square kilometer (km^2)	=	100 ha	=	0.3861 $mile^2$

Capacity/volume

1 cubic centimeter (cm^3)	=	1 cm^3	=	0.0610 in^3
1 cubic decimeter (dm^3)	=	1000 cm^3	=	0.0353 ft^3
1 cubic meter (m^3)	=	1000 dm^3	=	1.3080 yd^3
1 liter (liter)	=	1 dm^3	=	1.76 pt
1 hectoliter (hl)	=	100 liter	=	21.997 gal

Mass (weight)

1 milligram (mg)			=	0.0154 grain
1 gram (g)	=	1000 mg	=	0.0353 oz
1 kilogram (kg)	=	1000 g	=	2.2046 lb
1 tonne (t)	=	1000 kg	=	0.9842 ton

USA MEASURES AND EQUIVALENTS

USA dry measure equivalents

1 pint	=	0.9689 UK pint	=	0.5506 liter

USA liquid measure equivalents

1 fluid ounce	=	1.0408 UK fl oz	=	29.574 ml
1 pint (16 fl oz)	=	0.8327 UK pt	=	0.4723 liter
1 gallon	=	0.8327 UK gal	=	3.7854 liter

IMPERIAL MEASURES AND EQUIVALENTS

Length

1 inch (in)			=	2.54 cm
1 foot (ft)	=	12 in	=	0.3048 m
1 yard (yd)	=	3 ft	=	0.9144 m
1 mile	=	1760 yd	=	1.6093 km
1 int. nautical mile	=	2025.4 yd	=	1.853 km

Area

1 square inch (in2)			=	6.4516 cm2
1 square foot (ft2)	=	144 in2	=	0.0929 m2
1 square yard (yd2)	=	9 ft2	=	0.8361 m2
1 acre	=	4840 yd2	=	4046.9 m2
1 sq mile (mile2)	=	640 acres	=	2.59 km2

Capacity/volume

1 cubic inch (in3)			=	16.387 cm3
1 cubic foot (ft3)	=	1728 in3	=	0.0283 m3
1 fluid ounce (fl oz)			=	28.413 ml
1 pint (pt)	=	20 fl oz	=	0.5683 litre
1 gallon (gal)	=	8 pt	=	4.5461 litre

Mass (weight)

1 ounce (oz)	=	437.5 grains	=	28.35 g
1 pound (lb)	=	16 oz	=	0.4536 kg
1 stone	=	14 lb	=	6.3503 kg
1 hundredweight (cwt)	=	112 lb	=	50.802 kg
1 ton	=	20 cwt	=	1.016 tonne

Temperature conversion

C = 5/9 (F – 32) F = (9/5 C) + 32

Basis of Construction Costs

GENERAL NOTES

- The building costs for the respective asset types are averages based on competitive tenders analyzed by AECOM. It must be understood that the actual cost of a building will depend on the design and many other factors and may vary from the figures shown.
- Due to the volatile nature of the current market, it is possible that tenders will be received outside these ranges. Professional advice should be sought for specific projects.
- Relative costs of construction are based on typical build costs in USD. Influence of foreign exchange fluctuations, unique site conditions, design attributes and applicable tariffs must be considered when comparing actual projects.
- The standard for each building varies from region to region.
- General and specific cost inclusions and exclusions are listed below.

BASIC SPECIFICATION OF ASSETS

Asset type	Residential		
Typology	Low rise	Mid rise	High rise
Specification	Basic, medium & high	Basic, medium & high	Basic, medium & high
Key design characteristics			
Building height	G+1 to G+3	G+4/5 to G+20	G+20 & above
GIA	80,000 - 140,000	50,000 - 80,000	90.000 - 120,000
BUA	85,000 - 155,000	55,000 - 90,000	105,000 - 135,000
Efficiency (%)	85 - 100%	80 - 85%	70 - 80%
Units per core	1 - 2	10 - 20	4 - 6
Wall:Floor ratio	0.50 - 0.80	0.45 - 0.65	0.45 - 0.55
Net to gross	80 - 100%	75 - 85%	65 - 75%
GIA per unit	200 - 450m²	90 - 200m²	145 - 165m²

Asset type	Offices		
Typology	Low rise (shell & core)	Mid rise (shell & core)	High rise (shell & core)
Specification	Basic, medium & high	Basic, medium & high	Basic, medium & high
Key design characteristics			
Building height	G+1 to G+5	G+5 to G+20	G+20 & above
GIA (m²)	10,000 - 25,000	25,000 - 75,000	100,000 - 250,000
BUA (m²)	13,000 - 30,000	30,000 - 100,000	130,000 - 280,000
Efficiency (%)	70 - 85%	70 - 80%	70 - 80%
Wall:Floor ratio	0.40 - 0.70	0.40 - 0.60	0.40 - 0.50
Net to gross	50 - 60%	50 - 60%	50 - 70%
Slab to slab height	4.0 - 5.0m	4.0 - 4.5m	4.0 - 4.5m
Grid spans	7 - 12m	9 - 12m	9 - 12m

Asset type	Retail		
Typology	Community	Regional	Super regional
Key design characteristics			
Finishes	Mid range	High	High
GFA (m²)	Not exceeding 30,000	30,000 - 100,000	> 100,000

Asset type	Industrial			
Typology	Light duty factory	Heavy duty factory	Light industrial unit (LIU)	Data center — Tier 3
Specification	Basic	Basic	Basic	Basic
Key design characteristics				
Building height	8	10	6	4
GIA	10,000	20,000	6,000	G
Wall:Floor ratio	0.33	0.30	0.38	2,000

Asset type	Hotel			
Typology	Budget	Mid market	Up market	Resort
Specification	Basic	Mid range	luxury	High end
Key design characteristics				
Building height	G+10	G+10	G+15	G+6
GIA	16,000 - 18,000	13,500 - 15,500	56,000 - 60,000	39,000 - 41,000
Efficiency	70%	75%	75%	55%
Functional units	350	200	350	200

Asset type	Schools	Healthcare
Typology	Primary/secondary academy	District hospital
Specification	Mid range	Mid range
Key design characteristics		
Building height (m)	10	24
GIA (m²)	21,000 - 22,000	50,000
No of lift core	1	4
No of stair core	9	6

GENERAL COST INCLUSIONS

Construction works
Main contractor preliminaries and OH&P

GENERAL COST EXCLUSIONS

External works and landscaping
Site infrastructure
Enabling works
Basements and car parks (incl. podium)
Contingencies
Undefined provisional sums
Utility connection charges
Statutory fees and charges
Professional fees
Client direct costs
Land acquisition
Finance charges
LEED silver or above
Staff accommodation
Pre-opening expenses
Mock ups

ADDITIONAL INCLUSIONS AND EXCLUSIONS BY ASSET TYPOLOGY

Asset class	Cost inclusions	Cost exclusions
Residential	• Fit-out works • MEP services Installations • Lift services Installations	
Commercial offices	• Internal finishes — lobby and core areas only • Fit-out works — lobby and core areas only • MEP services installations — lobby and core areas only • Lift services installations	• Internal finishes to offices • MEP services installations to offices • Active IT and phone equipment.
Fit out (commercial offices)	• Fit-out works — architectural • Fit-out works — MEP ervices • Specialist installations (AV, IT, security) • FF&E	• Active IT and phone equipment.
Retail	• Front of house fit out • Loose furniture and operators equipment • Kitchen and laundry equipment • Active IT equipment	• Tenant fit out
Industrial (light duty factory)	• Internal services • FF&E	• Storage/racking systems • IT and CCTV active equipment • OS&E • Production, process and laboratory equipment • Waste water treatment plant, compressed air plant • Process water and drainage systems • N+1/2 redundancy • Humidity/environmental control/conditioning other than standard air conditioning • Ultra flat slabs
Data centers		• Active equipment • FF&E • Utilities outside the building outline • Modular construction (based on one complete data centre)
Hotel	• Fit out • Loose furniture and operators equipment • Kitchen and laundry equipment • Active IT equipment	
Healthcare, education	• Fixed Fit-out works only	• All loose fit out and ICT • All medical equipment
Infrastructure		• Site abnormalities • Primary substations • Art/water features • Offsite infrastructure reinforcements • Assumes development FAR of less than 1.5 • Public realm/landscape is 50/50 hard and soft • Excludes district cooling • Excludes authority contribution

Section

FIVE

AECOM Middle East Construction Survey

About AECOM's Middle East Construction Survey

In its second edition, AECOM's Middle East Construction survey once again asked key decision makers from government, developers, engineering and construction companies operating in the Middle East about their view on the state of the market. All survey responses were gathered through online questionnaires. Company-specific responses to the survey are kept strictly confidential by AECOM and only aggregate data is published.

The Middle East Construction Sentiment Survey assesses the state of the construction industry, examines the drivers and barriers currently at play, and reflects on concerns expressed by industry stakeholders. Respondents represent a cross section of organization sizes, locations and markets, including energy, transport, real estate, industrial, healthcare, education and government.

The questions we ask of the industry fall into the following categories:

1. Industry prospects
- Workload trends and expectations
- Growth markets and sectors
- Industry growth drivers and obstacles to growth
- Confidence in market outlook and key risks

2. Organizational prospects
- Workload trends and expectations
- Opportunities for growth
- Investment priorities
- Target markets and sector focus
- Growth strategies and tools for growth

3. Project planning and delivery
- Project Finance
- Project Performance and BIM
- Competition and costs

Once again, we are encouraged by the results of this year's survey and we will continue to engage with our clients to discuss industry trends and prospects and how we can respond to challenges and opportunities posed to us by our clients.

Should you have any suggestions for future content of our research efforts or would like to participate in future surveys, please do not hesitate to get in touch.

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