ENGINEERING & CONSTRUCTION

BUILDING BLOCKS – UNDERSTANDING THE INVESTMENT FUNDAMENTALS OF CONSTRUCTION AND ENGINEERING

By Alan Lok, CFA; Eunice Chu, ACCA; and Guruprasad Jambunathan, FRM

Construction and engineering are almost certainly the oldest industry we will explore in our investment frameworks series, as it goes back to our fundamental need for shelter. In 4850 BC, our Neolithic ancestors constructed the Cairn of Barnenez, the world's oldest-surviving building. This prehistoric Parthenon is 72 metres long, 25 metres wide, and over 8 metres high – an impressive size considering it took another 1,350 years to invent the wheel.

Jump to the present, and the industry is being revolutionised by technological advancement, albeit in a more subtle way than the progression from wooden hovels to steel skyscrapers.

This shift, termed "Industry 4.0," is more akin to the changes already happening in the finance and insurance space (fintech and insurtech). As such, elements of this guide may seem familiar, though definitely different in application. We will first examine the changes taking place in the industry, as these will lay the foundation for company analysis.

IT'S ALL ABOUT DATA

Construction and engineering companies are quickly realising they can enhance product and service delivery through data-based services. This is taking a couple of forms. First, data-based services allow automated yet closer interaction with end users. This enables the archiving of massive databanks at affordable cost. Second, drone surveillance technologies permit improved data collection abilities, leading to closer-at-heart project planning, design, and execution. Or put simply, better decision-making from more objective data. This combination lets companies monitor real estate over their entire life cycle instead of just the construction phase, while also generating a wealth of useful analytics for future projects.

JOINING THE INTERNET OF THINGS

The Internet of Things (IoT) revolution is very new and has only recently become part of the modern lexicon. With the development of advanced gadgets, such as built-in sensors and smart home devices, the industry can now, for the first time, join the IoT revolution. One example is how the capability for full and seamless integration with energy, waste, and water management leads to reduced costs and sped-up project timelines.

TYING IT TOGETHER WITH PREDICTIVE ANALYTICS

Most analytics are descriptive, making past data actionable. This is insightful but of little use in forecasting. For that, we turn to predictive analytics, which attempts to make robust forecasts using techniques including statistical modelling and machine learning.

In construction and engineering, this has several applications. One example is customised solutions to clients, while another is enhanced 3D-modelling capabilities for housing developments, permitting crystal-clear communication with residents and investors.

There is also Building Information Monitoring (BIM), which enables more effective deployment of modular design. With this, specific building components can be constructed offsite in safer and more cost-effective environments. Lastly, there's waste minimisation stemming from the continuous feedback loops from all aspects of the project.

FUNDAMENTALS AMID A CHANGING LANDSCAPE

This technological evolution will create more efficient, lower-cost companies. Those unwilling or unable to leverage on this may soon find themselves in the Darwinian scrapheap. The changes happening in the sector, particularly its strong interlinking with the IoT revolution, might pose a challenge for investors seeking a clearer picture. However, there remains a systematic way of analysing the industry – after all, it is still very much a bricks-and-mortar business.

ENGINEERING & CONSTRUCTION

CATEGORISING BY SERVICES AND MARKETS

With so many different subcategories within the sector, step one is determining the type of services a company offers and which market it serves. Is it a residential or non-residential construction company or an engineering services company? Keep in mind many firms are involved in a combination of two or more.

After identifying the firm's end markets, assess their structure, starting with the market share of the top providers split by services and end markets. Given its capital-intensive nature, construction typically has high barriers to entry, which could be even higher depending on local regulations.

MATCHING MARKETS TO DEMAND DRIVERS

Demand drivers within the industry will also be varied. While some factors like capacity utilisation rates, gross fixed capital formation rates, and demand cyclicality cut across all markets, each type of market has its own specific demand drivers. For instance, in the residential market, they will be factors like house prices and income levels, home ownership rates, consumer confidence, and ease of home financing.

For commercial markets, explore office vacancy rates and corporate infrastructure spending trends. Government demand is heavily influenced by economic policy, so study government spending statistics and legislative mandates on infrastructure spending. In Singapore, for example, the public sector has, in recent years, made up the lion's share of industry demand.

THE FINANCIAL FOUNDATIONS

Construction industry margins are notoriously low, making cost structure paramount. As such, you must closely inspect a company's books. Identify its main contract types – for example, are they cost plus, fixed price, or target price – and learn the benefits and drawbacks of each.

Next, consider the firm's top and bottom lined. Examine the revenue and profit split between services, markets, and regions, and look for variations in margins. For cost structure, investigate the major cost components and benchmark them against peers. Furthermore, see if any of the technologies discussed here are being used to enhance cost efficiency.

Don't forget the currency mix – forex volatility can wreak havoc on already thin margins. Also, scrutinise billing practices, things like how revenue is tied to percentage completion or costs incurred versus costs remaining.

THE OPERATION OF THE MACHINE

Revenue and profits don't tell the whole story. Proper working capital management is crucial to surviving in this industry. Research how a company raises its working capital and its weighted average cost. Are these costs expected to increase? How sensitive are they to interest and forex volatility?

A company's order book is as critical as its financials. Find out its size, and how much of it is backlogged. Again, the mix between services, markets, regions, and currency must be studied, with the added aspect of completion schedules as well. Get a picture of the future order book by looking at the pipeline that feeds into it: What percentage historically converts into concrete orders?

A simple look at historical performance can reveal a lot. Vet its track record: Has the company generally delivered its projects on schedule? If not, review the significance of these overruns and their implications.

ENVIRONMENTAL, SOCIAL AND GOVERNANCE FACTORS

According to the International Energy Agency, the construction industry accounts for 36% of global energy consumption and 40% of total CO_2 emissions. Concrete, the foundation of the industry, is the most widely used material in the world with adverse environmental impacts. As such, ESG factors will increasingly play a critical role in forming a company's reputation.

Analysing ESG factors comes down to a few key areas. Has the company taken any initiatives in improving energy efficiency? Has it implemented any environmentally sustainable practices and encouraged its clients and suppliers to do the same? On the social front, see if it has undertaken any community service initiatives.

Also determine if staff safety and welfare is emphasised. Were there efforts to improve gender diversity? Finally, establish if there have been any accusations of corruption or kickbacks, and if processes like proper procurement procedures and robust tender procedures are present.

ENGINEERING & CONSTRUCTION

LONG-TERM SUSTAINABILITY

Last, consider long-term demand drivers, because these structural demand drivers will influence the shorter-term ones. We can split these into three categories: investment-driven, consumption-driven, and regulation-driven.

Investment-driven factors encompass metrics such as the investment share of GDP in the relevant markets and the investment mix among the various sectors. Among these sectors, assess where future growth is expected to be derived.

For consumption-driven factors, look at the consumption share of GDP. Research the per capita availability and consumption of the various infrastructure facilities and services. Examples are the transportation, energy, and housing sectors. Again, study which ones are most likely to drive future growth.

Finally, we have regulation-driven factors, which are highly affected by themes. These include climate change, energy efficiency, renewable energy, and environmental quality. All these could trigger legislative and regulatory mandates, so determine whether such mandates would be positive or negative for a company.

This framework is intended to give you the building blocks for analysing the construction and engineering sector. Keep building upon it, and you will soon be sufficiently equipped to construct your own portfolio.
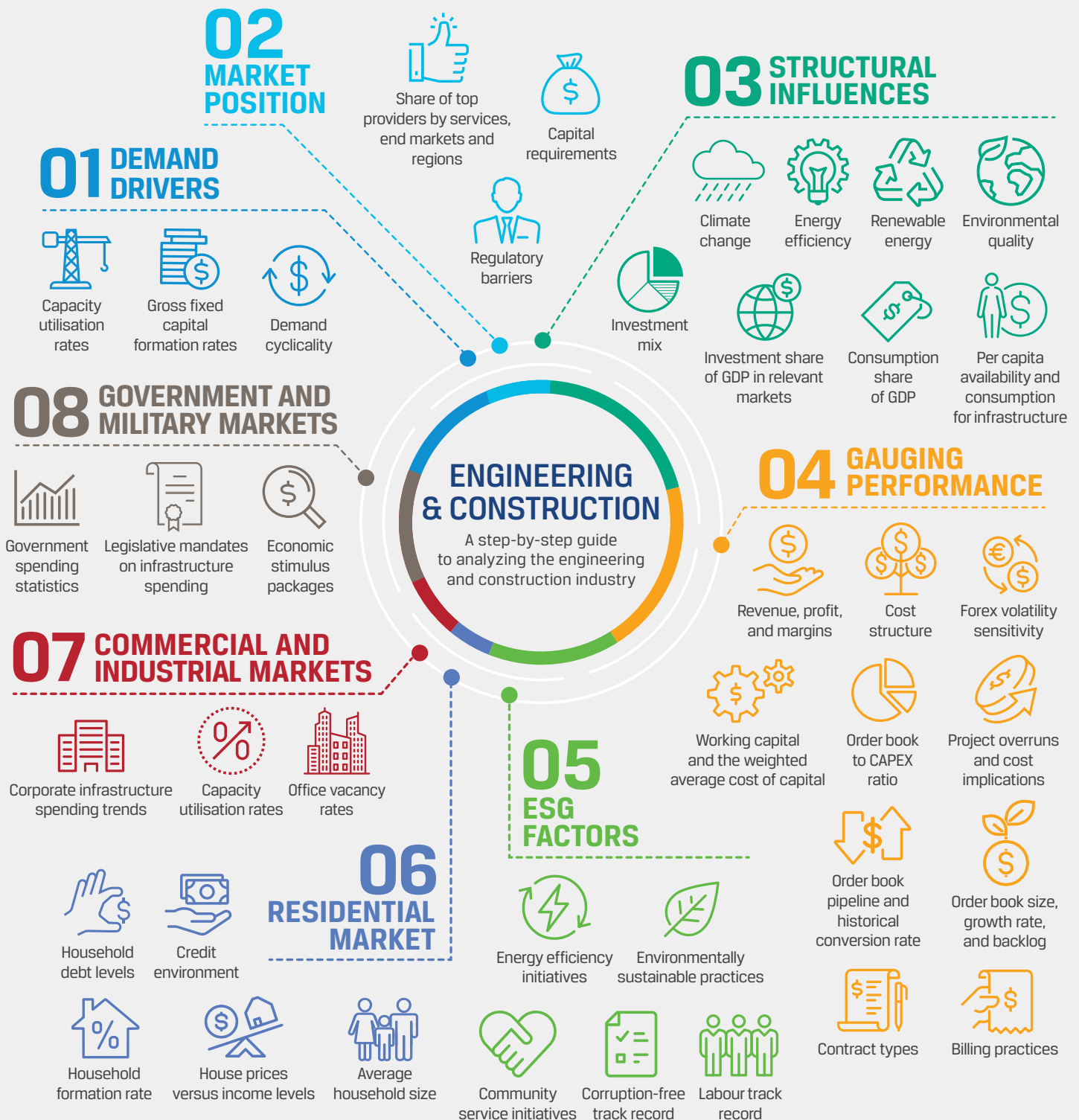
About the Authors

Alan Lok, CFA, is the director for society advocacy engagement at CFA Institute. Mr Lok researches and writes on investor-protection issues and capital-market structure. He recently co-authored a research paper on capital-market integrity entitled "Portfolio Pumping in Singapore: Myth or Reality." Mr Lok has more than 10 years of experience in equity research spanning various industries and sectors.

Eunice Chu is an ACCA-qualified finance professional. She was a regional finance director of a Fortune 500 multinational corporation and presently heads the policy function of ACCA Hong Kong.

Guruprasad Jambunathan, FRM, is a director for financial research at CRISIL, a global analytical company. He has over 12 years of experience in equity research and works closely with a broad clientele of buy-side and sell-side firms, as well as with academic think tanks across various continents.

This column is an excerpt from the joint research by CFA Institute, Association of Chartered Certified Accountants (ACCA) and CRISIL, entitled "Sector Analysis: An Investors Framework." The excerpt is printed here with permission from the three organisations. A full version of the research will be published on CFA Institute Asia-Pacific Research Exchange at www.ARX.cfa.

ENGINEERING & CONSTRUCTION

CFA Institute

ENGINEERING & CONSTRUCTION
A step-by-step guide to analyzing the engineering and construction industry

01 DEMAND DRIVERS

- Capacity utilisation rates
- Gross fixed capital formation rates
- Demand cyclicality

02 MARKET POSITION

- Share of top providers by services, end markets and regions
- Capital requirements
- Regulatory barriers

03 STRUCTURAL INFLUENCES

- Climate change
- Energy efficiency
- Renewable energy
- Environmental quality
- Investment mix
- Investment share of GDP in relevant markets
- Consumption share of GDP
- Per capita availability and consumption for infrastructure

04 GAUGING PERFORMANCE

- Revenue, profit, and margins
- Cost structure
- Forex volatility sensitivity
- Working capital and the weighted average cost of capital
- Order book to CAPEX ratio
- Project overruns and cost implications
- Order book pipeline and historical conversion rate
- Order book size, growth rate, and backlog
- Contract types
- Billing practices

05 ESG FACTORS

- Energy efficiency initiatives
- Environmentally sustainable practices
- Community service initiatives
- Corruption-free track record
- Labour track record

06 RESIDENTIAL MARKET

- Household debt levels
- Credit environment
- Household formation rate
- House prices versus income levels
- Average household size

07 COMMERCIAL AND INDUSTRIAL MARKETS

- Corporate infrastructure spending trends
- Capacity utilisation rates
- Office vacancy rates

08 GOVERNMENT AND MILITARY MARKETS

- Government spending statistics
- Legislative mandates on infrastructure spending
- Economic stimulus packages

ENGINEERING & CONSTRUCTION

Engineering and Construction Services

1. What are the services provided by the company?

a. What services does the company provide: engineering services (planning, design, programme management, operations, maintenance etc.), residential construction and non-residential construction)?

b. Which are the end markets: housing, offices, academic facilities, social and recreational, healthcare, oil & gas, transportation, power generation, utilities, mining, environmental services, industrial infrastructure, military infrastructure, non-military government infrastructure etc.?

2. What factors drive demand for the company's services?

a. What are the capacity utilisation rates in various end markets?

b. What is the Gross Fixed Capital Formation rate?

c. What are the consumption and investment shares of GDP? How is the mix evolving?

d. What is the extent of cyclicality and seasonality in demand for the company's services?

3. What are the demand drivers for the company's services to the residential market?

a. What is the average household size and household formation rate in the company's key markets?

b. What are the urbanisation, immigration and home ownership rates in the key markets?

c. How do house prices compare with income levels?

d. What are the household debt levels? What proportion of this is from residential mortgages?

e. How favourable is the regulatory environment for growth of the housing finance market?

f. How prevalent is housing finance and how easy is it to obtain home loans?

g. How stringent are the down payment requirements and credit assessment norms?

h. Are there any tax benefits to investors, builders and funders of housing?

i. What are the trends in building permit issuances, housing starts and home inventories?

j. How correlated are consumer confidence and employment conditions with building permit issuances, housing starts and inventories?

4. What are the demand drivers for services to the commercial and industrial markets?

a. What are the office vacancy rates?

b. What are the trends in discretionary corporate spending on buildings and other infrastructural facilities?

c. How do the current levels of capacity utilisation rate and capex spending compare with historical trends in different industries?

5. What are the demand drivers for services to the government and military markets?

a. How much is the government spending on infrastructure, as a percentage of GDP?

b. Are there any economic or sector stimulus packages currently in operation or expected in near future?

c. What are the existing or upcoming legislative mandates on infrastructure spending?

d. Are there any plans to increase deployments or expand logistics by the military?

6. What factors determining pricing and billing rates of your services?

d. What is the mix by different contract types: Cost Plus, Fixed Price, Target Price, Time and Materials?

b. What are the relative benefits and drawbacks of the different contract types?

c. Based on services provided and end markets served, which contract types are more beneficial?

7. What is the mix of revenue and profits?

a. What is the mix of revenue and profits by services, end markets and regions?

b. How do the margins vary by services, end markets and regions?

c. What is the extent of risk the company is exposed to, by different services, end markets and regions?

d. What is the currency mix of revenue and profits?

8. What are the details of the company's book of business?

a. What is the size of order book and backlog?

b. What is the mix of the order book by type of services, end markets and regions, currency and by completion schedule?

c. What is the size and details of option years held?

d. What is the size of the company's pipeline by type of services, end market and regions, currency and by completion schedule? What has been the pipeline to order conversion rate historically?

ENGINEERING & CONSTRUCTION

9. **What are the long-term drivers of the company's business?**

    a. What are the themes (such as infrastructure development, renewable energy, nuclear power, natural gas, environmental and climate change legislation) that are expected to drive business for the company's services in the long term, in different end markets and regions?

    b. What is the extent of structural growth expected from different services and end markets across regions?

    c. What is the company's strategy to leverage new-age technologies such as 5D building information modelling, reality mesh, digital high definition surveying, Internet of Things and smart sensors?

    d. To what extent is the company using, or planning to use, new age building materials?

10. **What are the investment-driven factors expected to influence structural demand?**

    a. What is the investment share of GDP in the key markets?

    b. What is the sectoral (industry, transportation, energy etc.) mix of investments?

    c. Which are the sectors expected to drive future growth?

11. **What are the consumption-driven factors expected to influence structural demand?**

    a. How much is the consumption share of GDP in the key markets?

    b. What is the per capita availability and consumption of various infrastructure facilities and services (such as transportation, energy, utilities, healthcare, housing and recreation) in the key markets?

    c. Which of these consumption factors are expected to drive growth in future?

12. **What are the regulation-driven factors expected to influence structural demand?**

    a. What are the existing, upcoming or expected legislative and regulatory mandates on themes such as inclusive development, universal coverage, sustainability, climate change, energy efficiency, renewable energy and environmental quality?

    b. Which are the company's services that are likely to benefit from these mandates?

    c. How does the company's current business and capability profile compare with what will be in demand?

13. **What is the extent of market concentration? What are the key barriers to entry?**

    a. What is the share of top 3 and top 5 providers by services, end markets and regions?

    b. What are the factors facilitating or impeding entry of new players?

    c. What are the approvals and licences required? What is the ease and cost of getting these?

    d. How easy is it to get a skilled management team and engineering and technical staff?

    e. Do any existing or proposed labour or immigration regulations affect the company's ability to bid, win or execute projects in specific geographies?

14. **How has the company performed on operational measures? How does the performance compare with that of peers? How are these expected to evolve?**

    a. What has been growth rate of company's order book? What are the details by type of services, end markets, regions and contract types?

    b. What are the major components of cost of services?

    c. How much is the employee and labour cost as a percentage of total cost and revenue?

    d. What is the revenue and profits per employee?

    e. Which services and end markets are the most profitable?

    f. What is the share of fixed-price contracts in the company's order book, revenue and profits?

    g. What has been the extent of time overruns of the company's projects across services, end markets and regions?

    h. What has been the financial implications of the overruns?

15. **How does the company manage its working capital (WC) requirements?**

    a. What is the preferred mode of raising WC?

    b. What is the currency mix of the company's WC?

    c. What has been the company's weighted average cost of WC?

    d. How are the currency mix and cost of the WC expected to evolve?

    e. What is the impact of interest rate changes and exchange rate volatility on the company's WC cost and margins thereupon?

    f. Do some services, regions and contract types require higher levels of working capital than others?

ENGINEERING & CONSTRUCTION

16. How have the capacity utilisation rates been?

a. How has the book-to-bill ratio trended?

b. What has been the order book to capex ratio?

c. What is the capex budget and spending plan for the next few years? What is the underlying strategy?

d. Has the cash burn rate been consistent with billing schedules?

e. Are there specific end markets or regions where there are significant delays between the time expenses are incurred and payments are received from clients?

17. How is the credit worthiness of clients assessed?

a. What is the credit profile of the clientele? What are the details of the exposure of order book by end markets and regions?

b. How are delayed, partial and non-payments from clients managed?

18. How has the company performed on financial measures? How do these compare with peers? How are these expected to evolve?

a. How has been the revenue growth? What is the breakdown by services, end markets, regions, contract types and currency movements?

b. How much of the revenue is tied to the percentage completion billing arrangement?

c. How much of the revenue is billed on the costs incurred relative to the costs remaining basis?

d. In case of fixed price contracts, typically how much of the project related out-of-pocket expenses are reimbursed by clients?

e. What has been the company's gross, operating and net margins?

f. What is the sensitivity of revenue and margins to forex volatility?

🌐 Environmental, Society and Governance

19. What are the details of the company's ESG principles, practice and track record?

a. What is the company's strategy, practices and track record in reducing the energy intensity, water intensity, emissions intensity, material consumption, waste generation and overall environmental and ecological footprint during execution of projects?

b. How does the energy consumption, emission, water use and waste generation intensity during the normal functioning of the buildings and other infrastructure compare with industry benchmarks? What are the initiatives taken to reduce these?

c. Does the company actively encourage and supports clients to adopt sustainable practices during normal use of buildings and other facilities constructed by it?

d. When the projects entail demolition of built structures, how much of the material is typically recovered? What is the procedure for handling recoveries and debris arising from the demolition?

e. Where possible, are features suited to the local climate incorporated in projects?

f. How much recycled, eco-friendly and locally sourced material are used in constructing buildings?

g. Is the effect on biodiversity of projects located near protected areas and areas of High Conservation Value (HCV) assessed prior to project execution?

h. Has the company been involved in protection or restoration of any habitat critical for endangered species or of HCV?

i. What has been the level of involvement in environmental or biological remediation projects as part of the company's sustainability initiatives?

j. As part of community-service initiatives, what are the details of any investments, services and sharing of expertise provided for public benefit?

k. How has been the company's track record regarding the safety and fair treatment of labourers involved in its projects? What is the total number of fatalities, days lost and injuries in relation to total number of personnel employed?

l. What is the proportion of total work sub-contracted or outsourced? What is proportion of total number of personnel employed and revenue generated?

m. How much is the typical spend on maintenance and safety at the company's offices and project sites?

n. Has the company faced accusations of indulging in corruption and offering kickbacks to win projects?

o. What is the company's policy and track record relating to political donations?