Construction in Developing Countries: current imperatives and potential

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Congress theme: Intelligent Built Environment for Life

What does it mean for developing countries?

- Building for life – importance of quality, durability, longevity.
- Building for life – quality of life, social factors.

- Intelligent building – we should not be left behind.
- ‘Intelligence’ – how we can use it to enhance capability, capacity.
- Intelligence’ – how we can use it to leapfrog.
1.0 Introduction

Review of state of knowledge on construction industries in developing countries.

**Aim**: to explore new ways to develop the industries.

**Objectives**

- consider needs for built items in developing countries in context of national development
- examine challenges, problems facing construction industries which must fulfil these needs
- consider usual solutions proposed
- explore possible new, contextually relevant ways to develop industries and improve their performance
- consider how construction in developing countries can leapfrog developmental stages; and draw lessons for industrialised countries.

Subject here: to consider contribution construction industry can make to effort to find viable solutions to development challenges of developing countries.
• Studies since mid-1960s.
• Early works: University College Economics Research Group (UCERG).
• Ofori (1993, 2012a) reviews development of knowledge on subject.
CIB NEWS ARTICLE
International Council for Research and Innovation in Building and Construction

Providing a global network for international exchange and cooperation in research and innovation in building and construction, in support of an improved building process and of improved performance of the built environment.

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Conclusions and Recommendations

by Prof. George Ofori

On behalf of the delegates

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Global agenda for construction ..2

To Researchers
As a community of researchers, we recognise we should:
• develop greater understanding of relationship between construction and development. For example, we should establish most effective ways built environment sector can contribute to poverty reduction and realisation of other societal objectives
• adopt a broader perspective to our research, and adopt a multi-disciplinary approach, embracing also, social development
• move forward our work on sustainable development as it relates activities of built environment sector, to propose practical solutions to issues of energy management, resource conservation, limiting pollution; and establish common meanings
• ensure we know implications of the same term or expression, in order to foster dialogue among researchers
• engage industry, and endeavour to make our work relevant to the needs of industry.

To Built Environment Sector
• We urge built environment sector and its component parts to identify, prioritise challenges which it faces, and develop appropriate responses. Sector should:
  − undertake design with respect for, and knowledge of, local history, identity, culture, nature, ecological system, climate and social and national characteristics
  − realise that research and innovation can be foundations of sustainable competitive advantage
  − communicate its needs and problems to research community
  − forge linkages with academia to ensure more effective application of research results.
2.0 Development needs, goals and programmes

2.1 Washington and Post-Washington Consensus programme

• Various approaches taken to attain long-term development in poorer countries.

• Washington Consensus in use over 1980s to 1990s comprised (Williamson, 2004):
  – Fiscal discipline
  – Public expenditure priorities - moving them away from subsidies and administration
  – Tax reform
  – Financial liberalisation
  – Exchange rates - managed to induce growth in non-traditional exports
  – Trade liberalisation
  – Increasing foreign direct investment
  – Privatisation
  – Deregulation
  – Secure intellectual property rights
  – Reduced role for the state.

• Package intensely debated, criticised (Williamson, 2004).
• It went through many changes.

By late 1990s, it comprised:
• sound fiscal and monetary policies
• broad-based taxes at moderate rates
• market determination of prices and quantities
• discriminating use of infant industry protection
• an acceptance of foreign direct investment
• **active government provision of education, health care, and infrastructure**
• anti-poverty programmes.

• Stiglitz (2004): sharp critique of 1980s and 1990s approaches; concludes that, given differences among countries, there can be no consensus.
Millenium Development Goals

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. Develop a global partnership for development

MDGs provided framework for socio-economic development from 2000 to 2015.
**Health**

* Global child mortality rate in 2015 less than half 1990 rate; fell from 90 deaths per 1,000 live births to 43 (from 12.7 million to 6 million).
  • Between 1990 and 2013 global maternal mortality ratio dropped 45%, from 380 deaths per 100,000 live births to 210.
  • Between 1995 and 2013 tuberculosis prevention, diagnosis, treatment actions saved 37 million lives worldwide.
* Between 2000 and 2015 malaria interventions saved 6.2 million lives.
* Since 2000, global responses to HIV have averted 30 million new infections.

**Education**

* Global youth literacy rate (ages 15–24) increased from 83% in 1990 to 91% in 2015. Adult literacy (ages 15 and older) rose from 76% to 86%.
  • Between 1990 and 2015, number of children in primary education rose in all regions; more than doubled in Sub-Saharan Africa.

**Income and poverty**

* Between 1990 and 2015, number of people living below $1.25 a day in developing countries fell from 1.9 billion to 836 million.
  • Proportion of undernourished people—individuals unable to obtain enough food regularly to conduct an active and healthy life—decreased in developing regions from 23.3% in 1990-92 to 12.9% in 2014-16. Prevalence of stunting among children under 5 fell from 40% in 1990 to 25% globally in 2013.
  • World’s gross national income per capita rose from PPP $8,510 in 1990 to PPP $13,551 in 2013.

**Access to basic social services**

* Access to improved drinking water source became reality for 2.6 billion people since 1990.
* Between 1990 and 2012, 2.1 billion additional people worldwide gained access to improved sanitation facility.
Progress in connectivity is impressive:

- by 2015, 95% of world’s population was covered by a mobile-cellular signal
- mobile-cellular subscriptions grew tenfold over 15 years, from 738 million in 2000 to 7 billion in 2015
- internet penetration grew from 6% of world’s population in 2000 to 43% in 2015
- 3.2 billion people were linked to a global network of content and applications.
## Extent of human deprivations in the world

### Poverty and hunger
- **Income poor**: 836 million (2015)
- **Chronic hunger**: 795 million (2014-16)
- **Children stunted**: 161 million (2013)
- **Children underweight**: 90 million (2015)

### Health, mortality and education
- **Children dying before reaching age 5**: 6 million (2015)
- **Maternal mortality**: 290,000 (2013)
- **People living with HIV**: 37 million (2014)
- **Illiterate adults**: 780 million (2012)
- **Illiterate young people**: 103 million (2015)
- **Functionally illiterate people in OECD countries**: 160 million (2009)
- **Children not at school at primary level**: 57 million (2015)
- **Children not learning basic skills**: 250 million (2014)

### Lack of access to basic social services
- **Safe water**: 663 million (2015)
- **Improved sanitation**: 2.4 billion (2015)
- **People resorting to open defecation**: 946 million (2015)
- **People living in urban slums**: 880 million (2015)

*Source: UN 2015b; UNAIDS 2015; UNESCO 2013a, 2014.*
880 million in 2015

https://www.google.com/?gws_rd=ssl#q=slums+images
Figure O.5 The internet remains unavailable, inaccessible, and unaffordable to a majority of the world’s population

a. ICT access by population

- Total global population: ~7.4 billion
- Within mobile coverage: 7 billion
- Mobile phones: 5.2 billion
- Total internet users: 3.2 billion
- High-speed internet: 1.1 billion

b. A closer look at the world’s offline population

- Countries outside of the top 20
  - Congo, Dem. Rep.: 68 million
  - Russian Federation: 63 million
  - Iran, Islamic Rep.: 54 million
  - Vietnam: 51 million
  - Egypt, Arab Rep.: 42 million
  - Turkey: 41 million

- Top 20 countries
  - China: 755 million
  - India: 1.063 billion


Note: High-speed internet (broadband) includes the total number of fixed-line broadband subscriptions (such as DSL, cable modems, fiber optics), and the total number of 4G/LTE mobile subscriptions, minus a correcting factor to allow for those who have both types of access. 4G = fourth generation; DSL = digital subscriber line; ICT = information and communication technology; LTE = Long Term Evolution.

(World Bank, 2016)
2.2 Post-2015 Development Agenda

• Post-2015 Development Agenda built around attainment of Sustainable Development Goals (SDGs) (United Nations, 2015b).

• SDGs are (United Nations, 2015b)...
  – integrated, indivisible, global
  – universally applicable, taking into account different national realities, capacities, levels of development, respecting national policies, priorities.

• Unlike previous ‘consensus’ approach, recognised that each government:
  – would set its national targets guided by global level of ambition but taking into account national circumstances
  – would decide how targets should be reflected in planning processes, policies, strategies
  – could use different visions, models, tools, in accordance with their contexts and priorities.
Sustainable Development Goals

Basic human and national needs

- Goal 1. End poverty in all its forms everywhere
- Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Goal 3. Ensure healthy lives and promote well-being for all at all ages
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- Goal 5. Achieve gender equality and empower all women and girls
- Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Some of our results

- Goal 6. Ensure availability and sustainable management of water and sanitation for all
- Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

What we must do

- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable
Sustainable Development Goals

Broad international goals
- Goal 10. Reduce inequality within and among countries
- Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

A key international ‘wherewithal’
- Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Our inputs and methods
- Goal 12. Ensure sustainable consumption and production patterns
- Goal 13. Take urgent action to combat climate change and its impacts*
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
2.3 Role of construction in meeting development needs

- Literature provides evidence on potential of construction in development.
- Authors such as Lopes (2009) continue work began in 1960s at UCERG on developing countries (Ofori, 1993).
- Ofori (2012a) and Zawdie and Murray (2008) examined how construction industry could help to attain MDGs.
- Ofori (2015) investigates its potential in pursuit of SDGs.
- Construction influences development through provision of infrastructure.
- Easterly and Levine (1997): infrastructure is strongly and significantly co-related with economic growth.
- Calderon and Serven (2008): Africa's economic growth per capita would be 1.0% higher if it had South Korea's infrastructure.
- Escribano et al. (2008): infrastructure has substantial effect on total factor productivity in Africa.

Thus: Post-2015 Development Agenda and SDGs themselves continue to be subjects of debate (Ofori, 2015), but consensus on importance of infrastructure for sustainable development.
Infrastructure also influences directly:
* Pillar 5
* Pillar 6
* Pillar 9
* Pillar 10.

Models for assessing competitiveness of countries give much weight to infrastructure provision (Schwab, 2016).
FIGURE 1.1 What Doing Business continues to cover

FIGURE 3.3 What is being added to dealing with construction permits changing
- Clarity and accessibility of regulations
- Quality control before construction
- Quality control during construction
- Quality control after construction
- Liability and insurance regimes
- Professional certification requirements

FIGURE 3.5 What is being added to getting electricity
- Duration and frequency of power outages
- Tools to monitor power outages
- Tools to restore power supply
- Regulatory monitoring of utilities' performance
- Financial deterrents aimed at limiting outages
- Transparency and accessibility of tariffs
- Price of electricity consumption

What this year's report adds and changes
Infrastructure needs are greatest in Sub-Saharan Africa, as shown in Table 1. Its infrastructure networks and services:

- lag behind those of other developing countries
- are characterised by missing regional links and stagnant individual access
- are twice as expensive as elsewhere.

### Table 1 Africa’s Infrastructure Deficit

<table>
<thead>
<tr>
<th>Normalized units</th>
<th>Sub-Saharan Africa low-income countries</th>
<th>Other low-income countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paved-road density</td>
<td>31</td>
<td>134</td>
</tr>
<tr>
<td>Total road density</td>
<td>137</td>
<td>211</td>
</tr>
<tr>
<td>Main-line density</td>
<td>10</td>
<td>78</td>
</tr>
<tr>
<td>Mobile density</td>
<td>55</td>
<td>76</td>
</tr>
<tr>
<td>Internet density</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Generation capacity</td>
<td>37</td>
<td>326</td>
</tr>
<tr>
<td>Electricity coverage</td>
<td>16</td>
<td>41</td>
</tr>
<tr>
<td>Improved water</td>
<td>60</td>
<td>72</td>
</tr>
<tr>
<td>Improved sanitation</td>
<td>34</td>
<td>51</td>
</tr>
</tbody>
</table>

Source: Yepes, Pierce and Foster (2008)
Note: Road density is measured in km per 100 square km of arable land; telephone density in lines per thousand population; generation capacity in megawatts per million population; electricity, water, sanitation coverage in percentage of population.
Figure 1.3 - Contribution of Infrastructure to Total Factor Productivity of Firms

a. Overall contribution of Infrastructure

- Namibia
- Botswana
- Swaziland
- Mauritius
- South Africa
- Kenya
- Madagascar
- Tanzania
- Niger
- Burkina Faso
- Mauritania
- Cameroon
- Mali
- Eritrea
- Uganda
- Zambian
- Malawi
- Senegal
- Cameroon

% contribution to total factor productivity:
- Infrastructure
- Others

Figure 8.2 - Economic Cost of Outages in Selected Countries

- Malawi
- South Africa
- Tanzania
- Senegal
- Kenya
- Mali
- Mauritania
- Burkina Faso
- Cameroon
- Benin
- Eritrea

% contribution:
- Electricity
- Information and technology


Note: Economic cost is estimated as the value of lost load multiplied by the volume of load shedding. Value of lost load is derived from country-specific estimates based on enterprise survey data for sales lost due to power outages.

• Role of construction industry in economic growth and national development is well recognised.
• Industrialised countries have broader expectations of construction than developing nations.
• Thus, a strong and efficient construction industry is a strategic national asset and it is necessary to explore its full potential, from the perspectives of developing countries.

New Zealand government: “At home, we need to address a persistent productivity gap to make sure our businesses remain competitive on the world stage. Infrastructure will play a key role in lifting productivity and ensuring we can take advantage of opportunities in the global economy.”

Government of Ireland (2014): in its path towards economic recovery (after 2008 economic, financial crisis), Ireland needed a strong and sustainable construction industry, because it needed good quality homes, high-quality commercial developments to underpin recovery and growth, and infrastructure fit for the future.

Sugii (1998), in Japan: “From the perspective of building social infrastructure efficiently, the improvement of labour productivity in the construction sector will lead to greater efficiency and intern competitiveness of the overall economy as well as to the long-term development of the construction industry.”

Vision for UK construction by 2025 includes an industry “that drives and sustains growth across the entire economy by designing, manufacturing, building and maintaining assets which deliver genuine whole life value for customers in expanding markets both at home and abroad”.
Reframing the question

1. What are the built products that developing countries will need in future?

2. What kind of construction industry will be required to deliver these products?

3. What will be the economic, social and environmental impact?

4. What needs to be done to prepare the industries to fulfil their tasks in building these items?

5. What will be enablers and constraints, and what will be pre-requisites for effective action?

6. How can construction industries enhance their capacity and capability as they build future items?
3.0 How ready is construction?
3.1 Construction industry problems and challenges

- Problems and challenges of construction industries in developing countries are well catalogued.

- Windapo and Cattell (2013) found in South Africa (in rank order):
  - increases in costs of building materials
  - access to affordable mortgage/credit
  - high interest rates
  - high rate of enterprise failure/delivery capacity and performance
  - mismatches between available skills and required skills
  - availability of infrastructure
  - external influences such as government legislation
  - availability of suitable land
  - public-sector capacity
  - poverty
  - critical global issues/globalization
  - procurement practices/ capacity for sustainable empowerment
  - technology.

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**Standard Bank, South Africa**
Prime lending rate is 10.50% effective from 18 March 2016.

**Ghana Commercial Bank**
Base rate is 22.76%, effective 7 July 2015.
• Ssegawa-Kaggwa et al. (2013) studied 323 public-sector projects in Botswana. Deficiencies in construction industry:

• Deficiencies of clients – inadequate competent personnel, poor project briefs, lack of project management approach, lack of effective project supervision, lack of prompt payment system for suppliers

• Deficiency in regulation of professionals, contractors and procurement process – ineffective, inefficient regulation of project procurement process, ineffective regulation of consultants, ineffective regulation of contractors

• Deficiencies of suppliers – incompetent consultants, inefficient and ineffective contractors, unreliable utility providers

• Deficiencies of facilitators (such as firms which provide information).
Planning Commission (2013) highlighted these constraints of construction industry in India:

- less than 6% of workers have structured training
- lack of unified national regulatory framework for construction firms
- lack of efficient, stable regime for dispute resolution
- shortcomings in contracting procedures (cumbersome, costly)
- lack of standardisation of core contract conditions, procedures and evaluation criteria
- time and cost over-runs
- high operation, maintenance, and financing costs
- low access to institutional finance (inadequate and costly)
- poor state of technology leading to inefficiencies, wastage, low value added
- poor quality of construction
- low productivity growth
- low investment in research and development (R&D).
Some new challenges of construction developing countries.

**First:** high volume of uncompleted buildings.
Williams (2015): study of over 14,000 local government projects in Ghana, showed one-third are never completed (small but vital projects such as schools, health posts).

**Second:** large volume of debt owed to construction firms by public-sector clients.
Delays in payment highlighted by researchers for many decades (Sambasivan and Soon, 2007).
However, situation, in many countries, is worse; delays run into many years (Fugar and Agyakwa-Baah, 2010).
Requires novel approach to solve, considering size of debt compared to annual public-sector development budgets and need to fund current and future projects.
Figure A4: Incomplete Staff Bungalow

Figure A5: Unfinished Classroom Block

Figure A6: Unfinished Classroom Block

(Williams, 2015)
Recapitulating The Payment Delays

By: Albert Poku Ababio

Road Contractors Threaten To Abandon Projects

By: Ghana Leaks

On: 1:37:00 PM

In: business, Ghana, Government

No comments

Ghana: Public Procurement: The Construction Contractors

Tagged: Business • Ghana

Economy
- Home
- Indicators/Summary
- Budget - Archive
- Tax
- Trade

Market
- Banks
- Exchange Rates
- Stock Exchange (GSE)
- Import/Export
- Import Duty
- Duty on Cars
- Registration fees

Business

Non-

Public Agenda (Accra)

Ghana: Public Procurement: The Construction Contractors

Tagged: Business • Ghana

ANALYSIS

By: Albert Poku Ababio

Accra — The huge expenditure by private sector in developing infrastructure without an advertisement scheme/government agencies/politicians, in procurement, be afflicted with the twin evils of the Public Benign Intention of instilling these twin evils.

Joseph Ebo Hewton

Members of the Association of Road Contractors (ASROC) Ghana and the Progressive Road Contractors Association (PROCA) cannot fathom why Government has failed to pay them for maintenance works they carried out for the country for 18 months.

The aggrieved members of the associations, who organized a joint press conference yesterday in Accra, claimed Government owed them a total amount of GH¢184 million.

Calling for the immediate payment of the money, the contractors noted that if Government fails to address their concerns, they would abandon all road projects across the country indefinitely.
• **Third:** increasing importance of stakeholders including traditional rulers, community leaders, ordinary people, now well educated, informed, empowered by mobile telephony, internet, social media.

• **Fourth:** growth of non-governmental organisations (NGOs) dedicated to monitoring projects, such as Road Watch in the Philippines; emergence of multi-stakeholder initiatives such as the Construction Transparency Initiative (Ofori, 2016).
By mid-year 2004, well established civil society organizations agreed to work together to train and/or field observers for bids and awards committees. This includes Procurement Watch Inc (PWI), the Catholic Bishops Conference of the Philippines (CBCP), National Movement for Free Elections (NAMFREL), Philippines Contractors Association (PCA), Transparency and Accountability Network. TANCBCP, NAMFREL, PCA all have nationwide reach...; the alliance was formalized in November 2004 with PWI serving as the Secretariat. Moreover, the Ombudsman has established a formal alliance with these groups in monitoring and reporting on government bidding activities. Exploring the possibility of having the participation as bid observers qualify as an activity under a government requirement for graduation that all college seniors must participate in a socially-oriented program. This proposed program would greatly expand the pool of potential civil society bid observers and, more importantly, would help educate a larger public on the importance of an efficient and clean public procurement process—.
Constraints in construction industry

• Construction industry in every country faces some issues.
• Problems in review of UK construction include (HM Government, 2013):
  – low vertical integration in supply chain, with high reliance on sub-contracting which often leads to fracture between design and construction management and to lost opportunities to innovate
  – low investment in R&D and intangible assets such as new processes (particularly in contracting) due to uncertain demand for new goods and limited collaboration
  – lack of collaboration, limited knowledge sharing; learning points from projects often team-based, lost when project ends and team breaks up; low technology transfer
  – high construction costs in comparison with foreign competitors, driven by inefficient procurement and processes rather than material input costs.

Vision includes: in UK, “Construction in 2025 is no longer characterized as it once was, by late delivery, cost overruns, commercial friction, late payment, accidents, unfavourable workplaces, a workforce unrepresentative of society or as an industry slow to change” (p. 18).

Ambition, under the strategy, was to achieve by 2025:
1. 33% reduction in both initial cost of construction and whole life cost of assets
2. 50% reduction in overall time from inception to completion for new build and refurbished assets
3. 50% reduction in greenhouse gas emissions in built environment
4. 50% reduction in trade gap between total exports and total imports for construction products, materials.
Construction 2020

A Strategy for a Renewed Construction Sector

May 2014

2016 Targets

- **GVA (Gross Value Added):** Increase GVA by 10% to £9.62bn
- **Innovation:** Achieve a 5% increase in reported innovation activity
- **Productivity:** Increase productivity by 10%
- **Efficiency:** 42% of industry waste to be recycled
- **Exports:** Increase exports activity by 10%
- **Skills:** Maintain Modern Apprenticeships completion levels
- **Leadership:** Increase leadership and management development activity in the industry, focusing on the future leaders of the industry
Good construction has an enormous role to play in improving UK productivity.
**Figure 3: Industry Productivity and Performance, 1964-2012**

Index of US labour productivity, 1964-2012

1. Peer set based on US companies with Engineering, Construction and Services-related Standard Industrial Classification codes. Financials are inflation-adjusted and indexed to 1964; output per working hours.

CAGR = compound annual growth rate

Sources: Global Vantage; Compustat; Bloomberg; www.aecbytes.com/viewpoint/2013/Issue_67.html; www.nber.org/papers/w1555.pdf; S&P Capital IQ; BCG ValueScience Center
• Issues to be addressed under Ireland’s construction industry strategy included (Government of Ireland, 2014):
  – strategic approach to provision of housing, based on real and measured needs
  – continuing improvement of planning process, striking right balance between current and future requirements
  – availability of financing for viable and worthwhile projects
  – ensuring the country has tools to monitor and regulate the sector so that it underpins public confidence and worker safety
  – ensuring a fit for purpose sector supported by highly skilled workforce achieving high quality and standards.
Aims of developing countries for construction

• Developing countries...
  – increasingly recognising strategic importance of construction industries
  – formulating national policies and strategies, forming institutions
  – taking action to ensure continuous development of their industries.

• Policy aims and objectives are ambitious.

Vision of government of Jamaica “is of a dynamic construction industry that fosters economic growth and international competitiveness that creates sustainable employment through the growth and the generation of new industry capacity” (Min of Housing, Tprt, Water and Works and Min of Infmtn and Dvpt, 2007, p. 2).

In Tanzania (Min of Works, 2003): “The goal of the construction industry development is to develop an internationally competitive industry that will be able to undertake most of the construction projects in Tanzania and export its services and products and ensure value for money to industry clients as well as environmental responsibility in the implementation of construction projects”.

In Rwanda (Min of Infra’ture, 2009, p. 9): “The National Construction Industry Policy aims to enhance delivery, stability, performance, and the growth of local businesses and professions within an organized and continuously improving institutional framework”.

Proposals being made in developing and emerging economies for addressing their construction challenges are similar to those in industrialised countries.
Aim: “a transformation of today’s construction industry into a modern, highly productive and sustainable industry that is able to enjoy continued growth and enable Malaysian companies to compete with international players whether domestically or abroad”.

Programme has four strategic thrusts:
1. Quality, Safety and Professionalism
2. Environmental Sustainability
3. Productivity
4. Internationalisation.

3.2 Developing country exceptionalism

- Ofori (2012b): differences between construction industries in industrialised countries and those in developing countries with respect to:
  - appropriate responses to inherent features of construction owing to differences in resources, sophistication of administrative systems and maturity of industries
  - differences in industries’ capabilities and performance
  - how the countries deal with the industry’s driving forces.

- Ofori (2012b, p. 8): “As, in the developing countries, resources for implementing the policies and programmes are limited, the need is great and time is of the essence, it is important that the knowledge that forms the foundation of the policies and programmes should be sound and practically and directly relevant”.

- Foster and Briceño-Garmendia (2010): cost of Africa’s infrastructure needs $93 billion per year in capital, and operation and maintenance expenditure (capital spending on power, water supply and sanitation, and transport were 26.7, 14.9 and 8.8 billion per year respectively).

- Fragile states face an impossible burden.
Power is Africa's largest challenge; 30 countries face regular shortages.
• Thus, construction industry should:
  – deliver projects which meet greatest level of performance with regard to the parameters (including new ones here such as affordability, durability, social performance)
  – contribute to economic growth and long-term national development
  – provide employment and enhance incomes
  – enhance quality of life of the populace
  – further grow and develop as an industry.

• Need for action across a broad spectrum of areas because project goals and performance parameters are closely inter-related.

• Latest International Monetary Fund (2016) forecasts: economies of many developing, emerging countries are facing stress; public budgets are tight.

• Thus, there should be, initial cost savings so that a bigger volume can be constructed; and higher quality and durability, in order to reduce repair and maintenance needs.
Industry’s responsibility

Capacity, capability of industry should be enhanced to enable them...

to deliver overall value for money for society

to provide jobs, ensure welfare of workers and neighbours

to produce to a high quality, durability

to recognise sustainability issues: environmental, social, economic

to meet increased demand from initiatives to realise SDGs

to deliver a higher volume of output to address SDG shortfalls

Construction industry has greater technical, professional and social responsibility in developing countries because: clients, users not knowledgeable on construction process; legal, administrative systems are weak.
3.3 Some ideas for improved industry performance

Integration of project team

Project governance

Community participation

Post-occupancy evaluation

Project health

Best practices

Some suggestions on improving construction industry performance made in industrialised countries for many decades, but seldom practised could be key in developing countries.
• First, reviews highlight fragmentation of construction industries as negative feature.
• HM Government (2013): separation of design from construction, reliance on subcontracting as important weaknesses of UK construction industry.
• Construction process in former metropolitan nations adopted in different administrative, cultural contexts in developing countries (Ofori, 1993).
• Some studies consider project arrangements used in developing countries as contributors to poor performance on projects, cite cultural disconnect (Rwelamila et al., 1999).
• Fresh approach needed in developing countries.
• Roles of participants could be based on selection of most appropriate persons and teams on basis of their technical and professional suitability in context of the project.
• Local cultural norms should inform design of contractual arrangements, project relationships.
• **Second:** project health: tracking key performance indicators on construction projects while they are underway, to enable action to be taken on them at relevant points (Humphreys *et al.*, 2004).

• Lessons seldom learnt, owing to:
  – uniqueness of projects
  – differences in teams for each project
  – poor data capture, analysis and dissemination in construction.

• In developing countries, maintaining *project health cards* rather than undertaking *project post-mortems* could be fostered.

• **Third:** participation of other stakeholders in construction process.

• Community participation in construction process not widely accepted among design professions (Wates and Knevitt, 1987), public officials (applied only as exception) (Moodley and Preece, 2008).

• Community’s involvement can:
  – make design more culturally and contextually relevant
  – optimise benefits to users and the community
  – ease disruptions to the lives and livelihoods of residents.

• Community’s involvement at operation, maintenance stage can provide performance information.
• **Fourth:** project governance.
  Construction has poor reputation among sectors, from Bribepayers’ Index (Transparency International, 2012).
• This is more important in developing countries:
  • They have poor corruption records. On Transparency International’s (2016) Corruption Perception Index, more than six billion people live in countries with serious corruption problems.
  • Global average score was 43 (out of 100); that for Africa was 33, and for Asia-Pacific region, 43.
• Thus, ethics is a key issue, and it should be incorporated into project structures and procurement and contractual arrangements, educational and training programmes in developing countries.

• **Fifth:** post-occupancy evaluation (POE) (National Academy Press, 2001).
  • Projects can produce stream of information for improving their performance and those of similar ones in future.
  • Such evaluations can be undertaken at regular intervals after completion.
  • For example, in developing countries where green building benchmarks have not yet been firmly established, the POE could incorporate environmental performance and could be undertaken some years after completion rather than during the design stage, followed by regular assessments.
  • National database on aspects of performance of items of construction could be considered. This information could be developed into best practice guides.
Governance in construction
Final example is “best practices”. In construction, they occur in exceptional situations only.

Construction Industry Institute (2015) categorises “best practices” under headings including:

- Advanced Work Packaging
- Alignment – where project participants are working within acceptable tolerances to develop and meet a uniformly defined and understood set of project objectives
- Benchmarking and Metrics
- Change Management
- Constructability
- Disputes Prevention and Resolution
- Front End Planning
- Lessons Learned

- Materials Management
- Partnering
- Planning for Modularisation
- Project Risk Assessment
- Quality Management
- Team Building
- Zero Accidents Techniques.

- Alignment – should be a common goal on projects.
- Benchmarking and metrics – applied in common in oil and gas sector (such as portal managed by Turner & Townsend).
- Partnering – considering culture, could be the norm in projects.
The Performance Forum is of particular benefit to those working in project assessment in order to:

- Benchmark project estimates to provide confidence level for risk assessment
- Measure project outcome performance and benchmark against peer group companies to determine best-practise
- Perform gap analysis of estimate versus actual costs/schedule
- Undertake bespoke pre-project studies such as viability of construction in specific regions
- Improve internal processes such as calibration of proprietary estimating tools.
- Identify future areas of strength and weakness using project cost/duration metrics

The Performance Forum demonstrates the competitiveness of your project costs/schedule against the industry benchmark.
• Cain (2003): goals for construction best practice:
  – delighted end users and clients
  – lowest optimum cost of ownership
  – elimination of inefficiency and waste
  – specialist supplier involvement in design
  – single point of contact for clients
  – proof of performance from measurement.

• Federal Facilities Council (2007): best practices owners should adopt at various project stages to minimise contract disputes.

• Lahdenpera (1998) suggested actions “to modify the operational modes of the construction industry for the common good”.

• Considering needs, circumstances, in developing countries, it would be appropriate to apply best practices routinely on all projects.
• Availability of information and communication technology makes wide application of the practices possible.

• Thasarathar (2016): technological trends in construction…
  – 3D printing
  – the Internet of Things (IoT)
  – robotics
  – drones
  – cloud computing
  – infinite computing
  – reality capture
  – augmented reality
  – gaming engines
  – crowd-funding
  – crowd-sourcing
  – generative design
  – big data
  – artificial intelligence.

• He notes: in future, the cloud will give access to unlimited amount of processing power to any company, regardless of size, location, or experience, on demand, to:
  – solve complex problems
  – connect to an unlimited number of people to get ideas
  – raise capital for projects, through funding techniques such as crowd-funding.

• He suggests: construction is in an era when “change is the new normal”, and “having a confident position on the technological future should be just as important to a construction contractor as having a strong balance sheet”.

• In POE, a database from a BIM linked to real time sensors can log metrics to determine building’s performance against what designers predicted, and quality of service it provides (Rogers, 2016).
3 Future Trends Set to Disrupt the Construction Industry

George Ofori believes construction academics should help improve when he presented his plan to a conference in July, there were some

The Millennium Development Goals (MDGs) are a set of ambitious targets designed to tackle the worst of the world's poverty by 2015. According to Professor George Ofori of the National University of Singapore, construction practitioners and academics should be helping to achieve them.

On the face of it, Prof Ofori's agenda seems uncontentious. When we research the built environment, he says, we should keep the MDGs in mind. And when we train project managers, we should teach them to pay heed to the social implications of their projects. Who would disagree with that?

Well, it seems some construction researchers would.

When Prof Ofori presented his plan to an international group of academics at a conference at Reading University in July, there were deep misgivings, rooted in discomfort that any one external agenda, however worthy, should be allowed to dominate. In other words, academia must be autonomous. If research becomes tailored to a particular agenda, that can weaken other strands – not least, criticism of the agenda itself.

But Prof Ofori believes there is a middle ground.

"All I'm suggesting is that we ask one simple question when we design our research: What does this do to help us move towards achieving those goals? Sometimes, the contribution might be marginal or peripheral, and sometimes we'll be doing valid research which is simply not relevant to the MDGs. But we should be taking note of anything we think might help.

"Also, I believe that sometimes we could amend our research design slightly in order to be a bit more relevant to these goals."

He recently presented a keynote paper in Sri Lanka, explaining how project managers should be trained to understand the bigger picture presented by the MDGs, and get an enthusiastic reception.

"According to Prof Ofori, construction produces the items crucial to the development process. "The fundamental networks – the infrastructure which allow for distribution, for instance – which underpin all advances in tackling poverty are created by us.""

If you consider the eight goals (see box), it is easy to see how the practice of construction could easily help meet them. Construction stimulates the economy, it provides jobs, it designs and builds schools, clinics and hospitals, it can employ women. Better site welfare could help stop the spread of disease. Solutions to poverty are needed.

W055 Construction Industry Economics
W065 Organisation and Management of Construction
W089 Education in the Built Environment

Joint International Symposium on:

GOING NORTH FOR SUSTAINABILITY: Leveraging Knowledge and Innovation for Sustainable Construction and Development
What is to be done?

Construction industry in each developing country should ask itself:

• in changing national and global economic, social scene, what does nation need from "built environment" 'sector'?
• how can industry be set up to enable pursuit of innovation and continuous performance improvement?
• how best can industry benefit from existing, emerging enablers, such as information technology?

• Each industry should seek context-specific solutions to its problems and challenges; global dissemination of practices, lessons learned would be useful.
• Each industry should scrutinise its practices and procedures and question assumptions which form bases of practice elsewhere.

• For example, US Federal Facilities Council (2007) notes: "Given the infinite complexities of delivering a building or infrastructure project, the multiplicity of organizations and individuals involved, and the magnitude of the dollars at risk, it is perhaps not surprising that the construction industry has been characterized by an adversarial operating environment that generates disputes and conflicts" (p. 1).
• Developing countries cannot afford to adopt this “practice norm”.
• As another example, Construction Industry Board of UK (1996) proposed a strategy to improve industry's image.
• Internal objectives in industry were:
  – provide better value for the client
  – improve the achievement of quality, professionalism, efficiency and profitability
  – improve professional relationships between constructors, consultants and clients.

• External objectives:
  – attract greater investment
  – encourage more construction work to the responsible contractors and consultants
  – improve environmental and social relationships
  – attract high-standard recruits
  – encourage equal opportunities.

• One could argue that this range of objectives should be attained on projects on a routine basis.
• In developing countries, these 7 objectives should be the norm.
Developing countries can leapfrog stages of development.

First: role of community in projects can be applied through the traditional system of (societal) governance and increasing strength of “development committees” representing particular districts.

Chiefs and local committees can contribute to aspects of projects in their areas over their life cycle.

This will make ‘extended’ stakeholder management necessary, resulting in leadership by developing countries in that area.

Community could pool ownership and crowd fund essential infrastructure and social projects.

Construction companies could set up joint venture entities with communities.

Second: developing countries have opportunity to derive meaning for, or apply aspects including:

- construction as a contributor to value and wealth creation
- effective, culture-sensitive, contextually-relevant project team selection and dynamics
- innovative community involvement in project planning, design, operations, maintenance
- effective value chain formation and management, including strategic alliances among firms in design and construction for continuous operations and possibly, formation of multi-disciplinary firms as a norm.
How Africa can lead the way in the Fourth Industrial Revolution

Follow the debate via our live-streamed session Africa’s Fourth Industrial Revolution – taking place at 11:00 on Thursday 12 May at the World Economic Forum on Africa, in Kigali.

The idea that exponential technologies – those innovations that change the world as we know it – might allow Africa to lead the way in the Fourth Industrial Revolution seems far-fetched for some. After all, two in three people on the continent lack access to electricity.

But it’s precisely these types of deficiencies that could allow Africa to use existing technologies such as 3D printing, artificial intelligence and the internet of things to become the next great ‘leapfrogging’ success story.
### Table O.2: Classifying the digital citizen engagement cases

<table>
<thead>
<tr>
<th>Case</th>
<th>Location</th>
<th>Additional offline mobilization</th>
<th>CSO partners with government</th>
<th>Collective feedback</th>
<th>Impact: Citizen uptake</th>
<th>Impact: Government response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Por Mi Barrio</td>
<td>Uruguay</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>I Change My City</td>
<td>India</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>M</td>
<td>H</td>
</tr>
<tr>
<td>Lungisa</td>
<td>South Africa</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Pressure Pan</td>
<td>Brazil</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>H</td>
<td>M</td>
</tr>
<tr>
<td>Rappler</td>
<td>Philippines</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>H</td>
<td>M</td>
</tr>
<tr>
<td>Change.org</td>
<td>World</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>H</td>
<td>M</td>
</tr>
<tr>
<td>U-report</td>
<td>Uganda</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Huduma</td>
<td>Kenya</td>
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<tr>
<td>Daraja Maji Matone</td>
<td>Tanzania</td>
<td>✓</td>
<td></td>
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<td>L</td>
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<tr>
<td>FixMyStreet</td>
<td>Georgia</td>
<td></td>
<td></td>
<td>✓</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Check My School</td>
<td>Philippines</td>
<td>✓</td>
<td></td>
<td>✓</td>
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<td>L</td>
</tr>
<tr>
<td>Barrios Digital</td>
<td>Bolivia</td>
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<tr>
<td>e-Chautari</td>
<td>Nepal</td>
<td></td>
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</tr>
<tr>
<td>I Paid a Bribe</td>
<td>India</td>
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<td>✓</td>
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<td>L</td>
</tr>
<tr>
<td>Mejora Tu Escuela</td>
<td>Mexico</td>
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<tr>
<td>Karnataka BVS</td>
<td>India</td>
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<tr>
<td>Sauti Za Wananchi</td>
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<td>✓</td>
<td></td>
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<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>

Source: WDR 2016 team, based on Peixoto and Fox 2015, for the WDR 2016.

Note: Examples are arranged by degree of government response. CSO = civil society organization. L = low; M = medium; H = high.
• **Finally:** availability of infinite computing power to industries in developing countries offers many possibilities.

• Examples include:
  – enhancing briefing, planning, design processes using augmented and virtual reality;
  – using capabilities of IoT – to collect, analyse performance data in operation of items, such as volume of passengers, trade carried on a road, to guide decisions on maintenance or rehabilitation
  – small firms setting up effective project and enterprise management systems.
Urbanise is the creator of the first cloud-based platform for delivering building services. By automating, detecting, predicting, connecting, communicating and engaging, the Urbanise Platform outperforms conventional solutions and completely transforms the traditional approach to building operations. With all processes, systems and technologies integrated into a single platform – Urbanise allows building operators to improve customer service, reduce operational costs and create new revenue streams. With a single point of access to an entire building or portfolio of buildings, the Urbanise Platform is used in some of the tallest towers and prestigious communities around the globe. Urbanise is listed on the Australian Securities Exchange (ASX: UBN) and has offices in Australia, Malaysia, Singapore, South Africa, UAE and Europe.

www.urbanise.com
Figure 1.14 Firms’ use of the internet varies among six African countries, 2014

(a. Manufacturing)

- Managing inventory
- Selling online
- Marketing

(b. Services)

- Managing inventory
- Selling online
- Marketing


Note: The figures show the shares of firms in the manufacturing and services sectors that use the internet to manage their inventory, sell their goods or services, and do marketing. The results are based on 2,843 firms (1,458 manufacturing and 1,385 service firms) in these six African countries in 2014.

(World Bank, 2016)
Figure 1.3 Many advanced digital technologies have not yet diffused across firms in high-income countries, 2014


Note: For each technology, the chart shows the distribution across 32 high-income countries of the share of firms (with at least 10 employees) that use that technology. Data are for 2014 or the last available year. CRM = customer relationship management software; ERP = economic resource planning software; PC = personal computer; RFID = radio frequency identification technologies; SCM = supply chain management software.
South Africa powers ahead with 13 new renewable schemes

South Africa is moving ahead with 13 new renewable energy projects that will add more than a gigawatt to its generating capacity.

Wind, solar, hydro and biomass schemes will be commissioned by 2016 in the latest tranche of approvals under South Africa’s ambitious Renewable Energy Independent Power Producer (IPF) programme.

Energy minister Tina Joemat-Pettersson said on Thursday 16 April that letters of confirmation had been sent to preferred bidders on the schemes.

On Saturday 18 April South African power utility Eskom imposed rolling electricity cuts for the seventh straight day, cutting 2,000 MW off its strained grid.

Africa’s most advanced economy is struggling to meet demands for electricity and a major project to complete its newest coal-fired plant, the Medupi Power Station, has been hit by strikes.

Waste to be sucked away in new Indian finance hub

A brand new Indian finance and tech city intended to rival London and Singapore will have the world’s biggest centrally vacuum-powered waste disposal system, say the system’s inventors.

When it’s complete the Gujarat International Finance & Tech City (GIFT City), being developed in Gandhinagar, Gujarat, will generate more than 400 tonnes of waste per day from 600,000 people living and working there.

All that waste will be sucked down chutes and sorted into organic and recyclable streams by Swedish company, Envac.

Envac announced today that the first instalment of the system went live on site on 1 April this year.

Two towers, of more than a hundred planned, are now finished.

“This is undoubtedly one of the most exciting projects that we have had the opportunity to work on, not just because of its sheer scale but also because of its diversity and the fact that it’s a world first,” said Graham Bell, regional president of Envac Middle East and India.

“Each building will have two chutes channeling waste to seven underground collection stations. Envac will sort the waste into organic waste and recyclables”
5.0 Conclusion

• No construction industry is perfect.
• There is also no panacea for challenges faced by industries.
• Need to widen one’s horizon in seeking to improve industries in developing countries.
• In construction, only the best is good for the poor.
• Developing countries need ideals of construction.

• More research is needed to explore application of best practices and each of the 6 “previously proposed approaches” in developing countries.
• Maturity of the industry might not be a pre-requisite in all these cases; it could even be a hindrance.
• If construction industries in developing countries apply these ideals, they can teach their counterparts in industrialised nations.
Ensuring each project, each built item contributes to national sustainable development

Harmonising, aligning motivations; obtaining maximum commitment, contribution from project participants

Optimising combination of participants’ contributions

Applying best practices in all aspects of projects

Effectively developing the construction industry from each project

Providing leadership to the community

Ideals of construction for developing countries
end of presentation
thank you for your attention
Figure 2.25 The interaction between technology and jobs varies by occupation

Probability of being computerized and intensity in use of ICT at work, by occupation

Sources: WDR 2016 team, based on STEP household surveys (World Bank, various years) and Frey and Osborne 2013. Data at http://bit.do/WDR2016-Fig2_25.

Note: The probability of being computerized is obtained from Frey and Osborne (2013). ICT intensity is an index between 0 (no use of technology) and 19 (most use of technology). ICT = information and communication technology. The red lines represent the average values of ICT intensity (x-axis) and of computerization (y-axis) across the pooled sample of 10 developing countries with STEP household surveys.

(World Bank, 2016)
Between 1990 and 2014 the number of people living in countries in higher human development classifications rose, while the number of people living in countries in the low human development classification fell.

Source: Bofinger 2008.
Note: Thickness of lines reflects traffic volumes.
Strategic Relevance
23. Tenders should set out the strategic relevance of the research proposed to the purpose and policies of the Scottish Government, to the cross-Government Research Programmes ... and to the needs of end-users...

Scottish Government Economic Strategy
24. The purpose of the Scottish Government is to create a more successful country with opportunities for all of Scotland to flourish, through increasing sustainable economic growth. The Government's Economic Strategy sets out five strategic objectives towards which all policies and resources are focused and through which sustainable economic growth will be delivered: Wealthier and Fairer, Healthier, Safer and Stronger, Smarter, and Greener.
25. Tenders should demonstrate how outputs contribute to the objectives of the National Performance Framework, the five strategic objectives and the Government's single purpose.

Scottish Government Policies
27. Tenders should demonstrate an understanding of the wider policy context and the particular policy needs that the research outlined is designed to address. Tenderers are advised to involve key policy customers in the preparation of proposals in order to ensure the policy relevance of the research outputs.
A national research agenda ..3

Peer Review
57. All proposals will be subject to peer review. Review Criteria will include:

- Strategic Relevance
- Collaboration, Co-ordination and Networking
- Knowledge Exchange
- Scientific quality, feasibility and opportunity
- Finance and Value for money
- Management

58. To be accepted for funding, proposals must be judged to be of satisfactory relevance against strategic policy and end-user relevance criteria..., demonstrate satisfactory plans for knowledge exchange and be of at least national standard with respect to scientific quality.
Transforming our world: the 2030 Agenda for Sustainable Development

Preamble

This Agenda is a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in larger freedom. We recognise that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development. All countries and all stakeholders, acting in collaborative partnership, will implement this plan. We are resolved to free the human race from the tyranny of poverty and want and to heal and secure our planet. We are determined to take the bold and transformative steps which are urgently needed to shift the world onto a sustainable and resilient path. As we embark on this collective journey, we pledge that no one will be left behind. The 17 Sustainable Development Goals and 169 targets which we are announcing today demonstrate the scale and ambition of this new universal Agenda. They seek to build on the Millennium Development Goals and complete what these did not achieve. They seek to realize the human rights of all and to achieve
(Rogers, 2016)
Criteria for selecting research topic in all fields...
1. research output
2. impact of research
3. contribution to knowledge
4. likelihood of practical application
5. attention to application
6. contribution to the economy
7. contribution to society.
IAF Pre-Positioning: Integrative Building Solutions

Whole-systems consortium approach to achieve highly livable buildings & districts

Passive Design & Modelling

Façade Greenery

Solar PV on Rooftops

Building Envelope

AGC

BMS - Integration & Controls

Energy-efficient air-conditioning

Insulation

HVAC

Elevators

Lighting

Pavements

BASF

ThyssenKrupp

OSRAM

Schindler

Source: NUS
### TABLE 2.1 What Doing Business measures—11 areas of business regulation

<table>
<thead>
<tr>
<th>Indicator set</th>
<th>What is measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting a business</td>
<td>Procedures, time, cost and paid-in minimum capital to start a limited liability company</td>
</tr>
<tr>
<td>Dealing with construction permits</td>
<td>Procedures, time, warehouse and construction permit</td>
</tr>
<tr>
<td>Getting electricity</td>
<td>Procedures, time, the reliability of electricity</td>
</tr>
<tr>
<td>Registering property</td>
<td>Procedures, time, the land administration</td>
</tr>
<tr>
<td>Getting credit</td>
<td>Movable collateral</td>
</tr>
<tr>
<td>Protecting minority investors</td>
<td>Minority share and corporate governance</td>
</tr>
<tr>
<td>Paying taxes</td>
<td>Payments, time, regulations</td>
</tr>
<tr>
<td>Trading across borders</td>
<td>Time and cost to import auto parts</td>
</tr>
<tr>
<td>Enforcing contracts</td>
<td>Time and cost to judicial process</td>
</tr>
<tr>
<td>Resolving insolvency</td>
<td>Time, cost, outcomes and the strength of the recovery</td>
</tr>
<tr>
<td>Labor market regulation</td>
<td>Flexibility in entry to labor markets</td>
</tr>
</tbody>
</table>

### TABLE 2.2 What Doing Business does not cover

#### Examples of areas not covered
- Macroeconomic stability
- State of the financial system
- Level of training and skills of the labor force
- Prevalence of bribery and corruption
- Market size
- Security

#### Examples of aspects not included within the areas covered
- In paying taxes, personal income tax rates
- In getting credit, the monetary policy stance and the associated ease or tightness of credit conditions for firms
- In trading across borders, export or import tariffs and subsidies
FIGURE 3.3  What is being added to dealing with construction permits

FIGURE 4.4  Azerbaijan’s one-stop shop combined seven procedures into a single step in 2014/15

1. Preapproval
2. Submission of request
3. Permit

Architecture and city building approval
Fire safety clearance
Sanitation and epidemiology clearance
Water and sewerage clearance
Ecology and natural resources approval
Construction safety expert opinion
Project registration with construction safety agency

Source: Doing Business database.

- Transparency and accessibility of tariffs
- Price of electricity consumption
FIGURE 6.1  What the data for the building quality control index cover

2014

Quality of building regulations
Data on the quality of building regulations measure the accessibility of building regulations and the clarity of requirements for obtaining a building permit.

Quality control before construction
Data on quality control before construction assess whether licensed or technical experts are involved in approving building plans.

Quality control during construction
Data on quality control during construction record the types of inspections that are legally mandated during construction and whether they are carried out in practice.

Quality control after construction
Data on quality control after construction record whether final inspections are legally mandated after construction and whether they are carried out in practice.

Liability and insurance regimes
Data on liability and insurance regimes record which parties are held legally liable for structural defects and which are required to obtain insurance policies to cover damages caused by defects.

Professional certifications
Data on professional certifications assess the qualification requirements for the professionals who approve building plans and for those who supervise construction.

Source: Doing Business database.