**Construction in Developing Countries: Current imperatives and potential**

George Ofori

National University of Singapore

bdgofori@nus.edu.sg

**Abstract**

The study is a review of the state of knowledge on the construction industries in developing countries and an attempt to explore new ways to address the task of developing the industries to enhance their capabilities to deliver the buildings and infrastructure which the countries require to improve the quality of life of their citizenry. The nature of the long-term national development task of the developing countries is discussed to provide the background for the examination of the ways in which the construction industry can contribute to the fulfilment of the broad aspirations of the nations, and the attainment of their developmental goals.

The objectives are: to consider the needs for built items in the developing countries in the context of national development; to examine the challenges and problems facing the construction industries and consider the usual solutions suggested; to explore possible new, contextually relevant ways in which the industries can be developed and their performance improved; and to consider how construction in developing countries can leapfrog developmental stages, and draw lessons for the industrialised countries.

The study is based on an analysis of data on existing needs of construction items in the developing countries; and a review of literature on the development of the industries in these countries. An analysis of relevant key overarching issues and factors in the economies of the developing countries and a consideration of the construction industry from its basic nature, informed the drawing of inferences on new ways of improving the performance of the construction industries in the developing nations. The possibility of leapfrogging in many areas is explored. It is suggested that the construction industries in the developing countries have the potential to offer lessons for their counterparts in industrialised countries.

**Keywords**: construction industry, developing countries, infrastructure, future, leapfrog, lessons

**1.0 Introduction**

The construction industries of the developing countries have been studied since the mid-1960s. The earliest works were by the University College Economics Research Group (UCERG) which undertook many studies for the World Bank and International Labour Office. The development of knowledge on the subject is presented by Ofori (1993, 2012a). This study is a review of the state of knowledge on the construction industries in developing countries. Its aim is to explore new ways to develop the industries. The objectives are to:

1. consider the needs for built items in the developing countries in the context of national development
2. examine the challenges and problems facing the construction industries which must fulfil these needs and consider the usual solutions proposed
3. explore possible new, contextually relevant ways in which the industries can be developed and their performance improved
4. consider how construction in developing countries can leapfrog developmental stages, and draw lessons for the industrialised countries.

The study is based on an analysis of data on the needs of the economies and how construction can contribute to their realisation; a review of recent literature on the development of construction industries; and an analysis of the construction industry from its basic principles. The possibility of leapfrogging stages and lessons for industries in industrialised countries are considered.

**2.0 Development needs, goals and programmes**

**2.1 Washington and Post-Washington Consensus programme**

Various approaches have been taken to set the poorer countries on a path to long-term development. The Washington Consensus of economic development which was applied by the World Bank, International Monetary Fund, United Nations agencies and the US government over the 1980s and 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; and Reduced role for the state. This ‘package’ was intensely debated and criticised (Williamson, 2004). It went through many changes. By the late 1990s, it comprised: sound fiscal and monetary policies; broad-based taxes levied 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; and anti-poverty programmes. Stiglitz (2004) presents a sharp critique of the approaches in the 1980s and 1990s, and concludes that, given the differences among countries, there cannot be any consensus as a one-size-fits-all solution cannot work.

The Millenium Development Goals (MDGs) provided the framework for socio-economic development from 2000 to 2015. Progress was made in many areas including poverty reduction (in 1990, half of the population in developing countries lived on less than $1.25 a day, that proportion dropped to 14 percent in 2015; the number of people living in extreme poverty declined from 1.9 billion in 1990 to 836 million in 2015); and primary education (net primary school enrolment rate in developing regions reached 91 percent in 2015, from 83 percent in 2000; the number of out-of-school children of primary school age worldwide reduced by half, to 57 million in 2015, from 100 million in 2000) (United Nations, 2015a). The progress in connectivity is impressive. By 2015, 95 percent of the world’s population was covered by a mobile-cellular signal; the number of mobile-cellular subscriptions grew tenfold over 15 years, from 738 million in 2000 to 7 billion in 2015. Internet penetration grew from 6 percent of the world’s population in 2000 to 43 percent in 2015; and 3.2 billion people were linked to a global network of content and applications.

However, many of the targets were missed and much remains to be done (United Nations, 2015a). For example, in 2015, 91 percent of the global population was using an improved drinking water source, compared to 76 percent in 1990; 147 countries had met the drinking water target, but only 95 countries had met the sanitation target and 77 countries had met both targets. Worldwide, 2.1 billion people had gained access to improved sanitation, but 29.7 percent of the urban population in the developing countries still lived in slums in 2014 (although this fell from 39.4 per cent in 2000).

**2.2 Post-2015 Development Agenda**

The Post-2015 Development Agenda is built around the attainment of the Sustainable Development Goals (SDGs) (United Nations, 2015b). The SDGs are presented in Figure 1, categorised with respect to relevant aspects of construction. United Nations (2015b) considers the SDGs as being integrated and indivisible, global and universally applicable, taking into account different national realities, capacities and levels of development and respecting national policies and priorities. Unlike the previous ‘consensus’ approach, it recognises that each government would set its national targets guided by the global level of ambition but taking into account national circumstances; and decide how the targets should be reflected in planning processes, policies and strategies. Countries could use different visions, models and tools, in accordance with their contexts and priorities.

|  |  |
| --- | --- |
| **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 | **What construction 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**Some of construction’s 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 |
| **Inputs and methods of construction industry**\* 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 | **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 |

Figure 1 Sustainable Development Goals

**2.3 Role of construction in meeting development needs**

The subject here is to consider the contribution the construction industry can make to the effort to find viable solutions to the development challenges of developing countries. The literature provides evidence on the potential of construction in development. Authors such as Lopes (2009) continue the work began in the 1960s at UCERG on the developing countries (Ofori, 1993). Ofori (2012a) and Zawdie and Murray (2008) examined how the construction industry could help to attain the MDGs; and Ofori (2015) investigates its potential in the pursuit of the SDGs. Construction influences development mainly through the provision of the physical infrastructure. Easterly and Levine (1997) found that infrastructure is strongly and significantly co-related with economic growth. Fedderke and Bogetic (2006) found a long-term relationship between infrastructure and growth in South Africa. Calderon and Serven (2008) found that Africa's economic growth per capita would be 1.0 percent higher if it had South Korea's infrastructure. In a study on Africa in general, Escribano *et al.* (2008) found that infrastructure has a substantial effect on total factor productivity. Foster and Briceño-Garmendia (2010) found that: infrastructure has been responsible for over half of Africa’s recent improved growth performance. Models for assessing competitiveness of countries give much weight to infrastructure provision (Schwab, 2016). Thus, whereas the Post-2015 Development Agenda and the SDGs themselves continue to be subjects of debate (Ofori, 2015), there is a consensus on the importance of infrastructure for sustainable development.

Infrastructure needs are greatest in Sub-Saharan Africa, as shown in Table 1. Its infrastructure networks increasingly lag behind those of other developing countries and are characterised by missing regional links and stagnant individual access; its infrastructure services are twice as expensive as elsewhere. Power is Africa’s largest challenge; 30 countries face regular shortages.

The role of the construction industry in economic growth and national development is well recognised in developing and industrialised nations. As an example of the latter case, an element of the vision for UK construction by 2025 is 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”. Governments of many industrialised countries have broader expectations of the construction industry than in developing nations. In New Zealand, the government noted: “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…” (p. 7). Government of Ireland (2014) observed that in its path towards economic recovery (following the 2008 economic and financial crisis), Ireland needed a strong and sustainable construction industry, because it needed good quality homes and high-quality commercial developments to underpin recovery and growth, and infrastructure fit for the future. Sugii (1998) suggested: “From the perspective of building social infrastructure efficiently, the improvement of labour productivity in the construction sector will lead to greater efficiency and international competitiveness of the overall economy, as well as to the long-term development of the construction industry”. 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.

*Table 1 Africa’s Infrastructure Deficit*

|  |  |  |
| --- | --- | --- |
| *Normalized units* | *Sub-Saharan Africa low-income countries* | *Other low-income countries* |
| Paved-road density | 31 | 134 |
| Total road density | 137 | 211 |
| Main-line density | 10 | 78 |
| Mobile density | 55 | 76 |
| Internet density | 2 | 3 |
| Generation capacity | 37 | 326 |
| Electricity coverage | 16 | 41 |
| Improved water | 60 | 72 |
| Improved sanitation | 34 | 51 |

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.

**3.0 How ready is construction?**

**3.1 Construction industry problems and challenges**

The problems and challenges of the construction industries in developing countries are well catalogued. The findings of two recent studies in Africa can be outlined. Windapo and Cattell (2013) found the following in South Africa (in rank order): increases in the 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/globalisation; procurement practices/ capacity for sustainable empowerment; and technology. In a study of 323 public-sector projects in Botswana, Ssegawa-Kaggwa *et al*. (2013) found these deficiencies in the construction industry: (a) Deficiencies of clients – inadequate competent human resources, inadequate project briefs, lack of project management approach, lack of effective project supervision, lack of a prompt payment system for suppliers; (b) Deficiency in the regulation of professionals, contractors and the procurement process – ineffective and inefficient regulation of project procurement process, ineffective regulation of consultants, ineffective regulation of contractors; (c) Deficiencies of suppliers – incompetent consultants, inefficient and ineffective contractors, unreliable utility providers; and (d) Deficiencies of facilitators (such as firms which provide information).

Planning Commission (2013) highlighted these constraints of the construction industry in India: less than 6 percent of workers had structured training; lack of a unified national regulatory framework for construction firms; lack of an efficient and stable regime for dispute resolution; shortcomings in contracting procedures (they are cumbersome and 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 (it is inadequate and costly); poor state of technology leading to inefficiencies, wastage and low value added; poor quality of construction; low productivity growth; and low investment in research and development (R&D).

Some examples of new challenges facing construction industries in developing countries which have not yet been addressed can be raised. The first of these is the high volume of uncompleted buildings. Williams (2015) found that, in Ghana, a study of over 14,000 local government projects showed that about one-third are never completed, although these were small projects (with a median budget of US$36,000 and scheduled duration of five months). The second issue is the large volume of debt owed to construction companies by public-sector clients. Whereas delays in payment have been among the key problems highlighted by researchers for many decades (Sambasivan and Soon, 2007), the situation, in many developing countries, has significantly worsened, with the delays running into many years (Fugar and Agyakwa-Baah, 2010). This situation will require a novel approach to solve, considering the size of the debt compared to annual public-sector development budgets and the need to continue to fund current and future projects. The third issue is the increasing level of importance of stakeholders including traditional rulers, community leaders and ordinary people, now well informed, and empowered by mobile telephony (Thasarathar, 2016). Also important is the emergence and growth of non-governmental organisations (NGOs) dedicated to monitoring projects, such as Road Watch in the Philippines, and the emergence of multi-stakeholder initiatives such as the Construction Transparency Initiative (Ofori, 2016).

The construction industries in all countries face challenges and problems. Examples of recent reviews of construction industries in industrialised countries are now considered. The weaknesses of the UK construction industry identified in a strategic review were (HM Government, 2013): (a) low vertical integration in the supply chain, with high reliance on sub-contracting which often leads to fracture between design and construction management and a fracture between the management of construction and its execution leading to lost opportunities to innovate; (b) low investment in R&D and intangible assets; (c) lack of collaboration and limited knowledge sharing; and (d) high construction costs in comparison with the industry’s competitors, driven by inefficient procurement and processes. It was suggested in the review that the industry could significantly enhance its performance (HM Government, 2013). The ambition, under the strategy, was to achieve by 2025: 33 percent reduction in both the initial cost of construction and the whole life cost of assets; 50 percent reduction in the overall time from inception to completion for new build and refurbished assets; 50 percent reduction in greenhouse gas emissions in the built environment; and 50 percent reduction in the trade gap between exports and imports for construction products and materials.

The issues to be addressed under Ireland’s construction industry strategy included (Government of Ireland, 2014): a strategic approach to the provision of housing, based on real and measured needs; continuing improvement of the planning process, striking the right balance between current and future requirements; availability of financing for viable and worthwhile projects; ensuring the country has the tools to monitor and regulate the sector so that it underpins public confidence and worker safety; and ensuring a fit for purpose sector supported by a highly skilled workforce achieving high quality and standards.

The proposals being made in the developing and emerging economies for addressing their construction challenges are similar to those in the industrialised countries. The aim of Malaysia’s “Construction Industry Transformation Programme 2016-20” is: “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”. The programme has four strategic thrusts: Quality, Safety and Professionalism; Environmental Sustainability; Productivity; and Internationalisation.

**3.2 Developing country exceptionalism**

It is necessary to consider the special nature of the industries in developing countries. Ofori (2012b) shows that there are differences between the construction industries in industrialised countries and those in developing countries with respect to appropriate responses to the inherent features of construction owing to the differences in resources, sophistication of their administrative systems and maturity of their industries; differences in the industries’ capabilities and performance; and how they deal with the industry’s driving forces. Ofori (2012b, p. 8) argues that: “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”. For example, Foster and Briceño-Garmendia (2010) estimated the cost of Africa’s infrastructure needs at about $93 billion per year in capital, and operation and maintenance expenditure (required capital spending on power, on water supply and sanitation, and on transport were 26.7, 14.9 and 8.8 billion per year respectively). The fragile states face an impossible burden and even resource-rich countries lag behind. The construction industry also has a greater technical, professional and social responsibility in the developing countries because the clients and users are often not knowledgeable about the construction process; and the legislative and administrative systems are relatively weak.

Thus, the construction industry should: (a) deliver projects which meet the greatest level of performance with regard to the parameters (including new ones here such as affordability, durability, social performance); (b) contribute to economic growth and long-term national development; (c) provide employment and enhance incomes; (d) enhance the quality of life of the populace; and (e) further grow and develop as an industry. There is also a need for action across a broad spectrum of areas because the project goals and performance parameters are closely inter-related. For instance, the latest International Monetary Fund (2016) forecasts indicate that the economies of many developing and emerging countries are facing stress, and thus, 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.

**3.3 Some ideas for improved industry performance**

Some of the suggestions on improving construction industry performance which have been made in industrialised countries for many decades, but which are only practised in exceptional circumstances could be key in the developing countries. Six pertinent examples could be considered. These are: (a) effective co-ordination and integration of the contributions of members of project teams; (b) project health; (c) community participation in aspects of projects; (d) project governance; (e) post-occupancy evaluation; and (f) best practices. First, many reviews of construction industries highlight the fragmentation of the industries as a negative feature. HM Government (2013) considers the separation of design from construction and reliance on subcontracting as among the most important weaknesses of the UK construction industry. The structures of the construction process which are applied in the former metropolitan nations have been adopted in the different cultural and administrative contexts in developing countries (Ofori, 1993). Some studies consider the project arrangements used in developing countries as contributors to poor performance on projects and highlight the cultural disconnect (Rwelamila *et al*. (1999). Thus, in the developing countries, a fresh approach can be taken. The roles of participants could be based on the selection of the most appropriate persons and teams on the basis of their technical and professional suitability in the context of the project concerned. Local cultural norms should inform the design of contractual arrangements and project relationships, which are, currently, ‘foreign’.

The second example is project health: tracking key performance indicators on construction projects while they are underway, to enable action to be taken on them at relevant points has been proposed by some authors (Humphreys *et al*., 2004). This makes the learning of lessons a dynamic process. Otherwise, as noted in HM Government (2013), lessons are never learnt, owing to the uniqueness of projects, differences in teams for each project and poor data capture, analysis and dissemination in construction. In developing countries, the idea of maintaining *project health cards* rather than undertaking *project post-mortems* at the commissioning and feedback stages should be fostered.

The third example is the participation of other stakeholders in the construction process. Community participation in various aspects of the construction process, such as design, has not been widely accepted among the design professions (Wates and Knevitt, 1987), and has been applied on projects only as an exception (Moodley and Preece, 2008). The community’s involvement can make the design more culturally and contextually relevant; optimise benefits to users and the community; and ease disruptions to the lives and livelihoods of residents. The community’s involvement can extend to the operation and maintenance stage when members can provide performance information.

The fourth issue is that of project governance. Construction has a poor reputation among other sectors, as evinced by its score in the Bribepayers’ Index (Transparency International, 2012). This is more important in developing countries for many reasons. These nations have poor records with regard to corruption, for example, on Transparency International’s (2016) Corruption Perception Index, more than six billion people live in countries with a serious corruption proble. The global average score was 43 (out of 100); that for Africa was 33, and for the 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 the developing countries.

The fifth example is post-occupancy evaluation (POE) which has also been proposed for many decades (National Academy Press, 2001), but remains highly uncommon. Projects can produce a stream of information for improving their own performance and those of similar ones in future. Such evaluations can be undertaken at regular intervals after the completion of the item. 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. The possibility of establishing a national database on various aspects of the performance of items of construction could be considered. This information could be developed into best practice guides.

The final example is “best practices” (which might cover some of those discussed above). In construction, best practices occur in exceptional situations only. Construction Industry Institute (2015) categorises “best practices” under headings including: [Advanced Work Packaging](https://store.construction-institute.org/SearchResults.aspx?searchterm=04.01); [Alignment](https://store.construction-institute.org/SearchResults.aspx?searchterm=01.02) – where project participants are working within acceptable tolerances to develop and meet a uniformly defined and understood set of project objectives; [Benchmarking and Metrics](https://store.construction-institute.org/SearchResults.aspx?searchterm=08.05); [Change Management](https://store.construction-institute.org/SearchResults.aspx?searchterm=08.09); [Constructability](https://store.construction-institute.org/SearchResults.aspx?searchterm=02.01); [Disputes Prevention and Resolution](https://store.construction-institute.org/SearchResults.aspx?searchterm=10.01); [Front End Planning](https://store.construction-institute.org/SearchResults.aspx?searchterm=01.01); [Lessons Learned](https://store.construction-institute.org/SearchResults.aspx?searchterm=08.03); [Materials Management](https://store.construction-institute.org/SearchResults.aspx?searchterm=03.01); [Partnering](https://store.construction-institute.org/SearchResults.aspx?searchterm=07.02); [Planning for Modularisation](https://store.construction-institute.org/SearchResults.aspx?searchterm=01.03); [Project Risk Assessment](https://store.construction-institute.org/SearchResults.aspx?searchterm=10.06); [Quality Management](https://store.construction-institute.org/SearchResults.aspx?searchterm=08.01); [Team Building](https://store.construction-institute.org/SearchResults.aspx?searchterm=07.01); and [Zero Accidents Techniques](https://store.construction-institute.org/SearchResults.aspx?searchterm=11.01). Cain (2003) presents six 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; and proof of performance from measurement. Federal Facilities Council (2007) proposes best practices owners should adopt at various stages of projects to minimise contract disputes. Lahdenpera (1998) suggested actions “to modify the operational modes of the construction industry for the common good”. Considering the needs and circumstances, in developing countries it would be appropriate to apply best practices routinely on all projects.

The availability of information and communication technology makes the wide application of these six practices in developing countries possible. Thasarathar (2016) highlights technological trends in construction including: 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 and artificial intelligence. He notes that in future, the cloud will place a theoretically unlimited amount of processing power at the disposal of any company, regardless of size, location, or experience, on demand to: solve complex problems; connect to an unlimited number of people to get ideas; and raise capital for projects, through funding techniques such as crowd-funding. As an application for POE, Rogers (2016) suggests that a database from a building information model (BIM) linked to real time sensors can log many metrics to determine the building’s performance against what the designers predicted and the quality of service it provides.

1. **What is to be done?**

The construction industry in each developing country should ask itself: (a) in the changing national and global economic and social developments, what does our nation need from the "built environment" 'sector'? (b) how can the industry be set up to enable the pursuit of innovation and continuous performance improvement? (c) how best can the industry benefit from existing and emerging enablers, such as information technology? Each industry should seek context-specific solutions to its problems and challenges. It should scrutinise its practices and procedures and question assumptions which form their bases of practice elsewhere. For example, In the US, Federal Facilities Council (2007) notes that: "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 the industry's image. The internal objectives in the industry were: provide better value for the client; improve the achievement of quality, professionalism, efficiency and profitability; and improve the professional relationships between constructors, consultants and clients. The external objectives were: attract greater investment; encourage more construction work to the responsible contractors and consultants; improve environmental and social relationships; attract high-standard recruits; and encourage equal opportunities. One could argue that this range of objectives is what should be attained on projects on a routine basis. In the developing countries, these should be the norm.

Developing countries can leapfrog stages of development. First, the role of the community in projects can be applied through the traditional system of governance and the increasing strength of “development committees” representing particular districts. The chiefs and local committees can contribute to many aspects of the projects in their areas over their life cycle. This will also make stakeholder management necessary, resulting in leadership by the developing countries in that area. The community could pool ownership and crowd fund essential infrastructure and social projects in the area. Construction companies could set up joint venture entities with the communities.

Second, developing countries have the opportunity to derive meaning for, or apply aspects including: construction as a contributor to value and wealth creation; effective, culture-sensitive and contextually-relevant project team selection and dynamics; innovative community involvement in project planning, design, operations and 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. Finally, the availability of infinite computing power to the industries in developing countries offers many possibilities. Examples include: (a) enhancing briefing, planning and design processes using augmented and virtual reality; (b) using the capabilities of the IoT – to collect and analyse performance data in operation of items, such as the volume of passengers, trade carried on a road, in order to guide decisions on maintenance or rehabilitation; and (c) small firms using the available computing power to set up effective project and enterprise management systems.

**5.0 Conclusion**

No construction industry is perfect. There is also no panacea for the challenges faced by the industries. It is important to widen one’s horizon in seeking to improve the industries in developing countries. In construction, only the best is good for the poor. If one thinks of the ideals of construction, that is what the developing countries need. The ideals include: ensuring that each project and each constructed item contributes effectively to national sustainable development, and applying this in awarding and implementing projects; harmonising and aligning motivations and obtaining the maximum commitment and contribution from each project participant; optimising the combination of the participants’ contributions; applying best practices in all aspects of projects; effectively developing the construction industry from each project; and providing leadership to the community. More research is needed to explore the application of best practices and each of the six previously proposed approaches in developing countries. Maturity of the industry might not be a prerequisite in all these cases; it could even be a hindrance. If the construction industries in developing countries apply these ideals, they can teach their counterparts in industrialised nations.

**References**

Cain, C T (2003) *Building Down Barriers: A guide to construction best practice*. London, Spon.

Calderón, C and Servén, L (2008) “Infrastructure and Economic Development in SubSaharan Africa.” Policy Research Working Paper 4712. Washington, DC., World Bank.

Construction Industry Board (1996) *Constructing a Better Image*. London, Telford.

Construction Industry Development Board (2015) *Construction Industry Transformation Programme (CITP) 2016-20*. Kuala Lumpur.

Construction Industry Institute (CII) (2015) CII Best Practices, December 2, <https://www.construction-institute.org/Store/CII/Publication_Pages/bp.cfm?section=orders>

Easterly, W and Levine, R (1997) “Africa’s Growth Tragedy: policies and ethnic divisions.” *Quarterly Journal of Economics*, **112** (4): 1203–50.

Escribano, A, Guasch, J L and Pena, J (2008) Impact of Infrastructure Constraints on Firm Productivity in Africa, Working Paper 9, Africa Infrastructure Sector Diagnostic. Washington, DC., World Bank.

Fedderke, J W, and Bogetic, Z (2006) Infrastructure and Growth in South Africa: Direct and Indirect Productivity Impacts of 19 Infrastructure Measures, Policy Research Working Paper 3989, Washington, DC., World Bank.

Federal Facilities Council (2007) *Reducing Construction Costs: Use of best dispute resolution practices by project owners*. Washington, D.C., The National Academies Press.

Foster, V and Briceño-Garmendia, C (2010) *Africa’s Infrastructure: A Time for Transformation*. Washington, D.C., Agence Française de Développement and World Bank.

Fugar, F D K and Agyakwa-Baah, A B (2010) “Delays in building construction projects in Ghana.” *Australasian Journal of Construction Economics and Building*, **10** (1/2): 103-116.

Government of Ireland (2014) *Construction 2020: A strategy for a renewed construction sector*. Dublin, Stationery Office,

HM Government (2013) *Construction 2025 – Industrial Strategy: Government and industry in partnership*. London.

Humphreys, M and Mian, D and Sidwell, A (2004) A model for assessing and correcting project Health. In Proceedings of International Symposium of the CIB W92 on Procurement Systems, 7-10 January, Chennai, India.

International Monetary Fund (2016) *World Economic Outlook April 2016: Too Slow for Too Long*. Washington, D.C.

Lahdenpera, P (1998) *The Inevitable Change: Why and how to modify the operation al modes of the construction industry for the common good*. Helsinki, Technical Research Centre of Finland and Technology Development Centre of Finland.

Lopes, J (2009) “Investment in construction and economic growth: a long-term perspective.” In Ruddock, L. (eds) *Economics for the Modern Built Environment*. London, Taylor and Francis, pp. 94-112.

Moodley, K and Preece, C (2008) “Community interaction in the construction industry.” In Murray, M. and Dainty, A. (eds) *Corporate Social Responsibility in the Construction Industry*. Abingdon, Taylor and Francis, pp. 98-117.

National Academy Press (2001) *Learning from our Buildings: A state of the practice summary of post-occupancy evaluation.* Washington, D.C.

National Infrastructure Unit (2015) *The Thirty Year New Zealand Infrastructure Plan.* Wellington, New Zealand Government.

Ofori, G (1993) *Managing the Development of the Construction Industry in Singapore*. Singapore, Singapore University Press.

Ofori, G (2012a) “Construction and Millenium Development Goals.” In Ofori, G. (Editor) *New Perspectives of Construction in Developing Countries*. Abingdon, Spon, pp. 72-105.

Ofori, G (2012b) “Reflections on the great divide: strategic review of the book.” In Ofori, G. (Ed.) *Contemporary Issues in Construction in Developing Countries*. Abingdon, Spon, pp. 1-19.

Ofori, G (2015) “Construction and the Sustainable Development Goals: the role of research.” Presented at Joint International Symposium on “Going North for Sustainability: Leveraging knowledge and innovation for sustainable construction and development”, London, 23-25 November.

# Ofori, G (2016) “Transparency and accountability as antecedents of value for money in construction.” Paper presented at CIB World Building Congress on “Intelligent built environment for life, Tampere, Finland, 30 May to 3 June.

Planning Commission (2013) *Twelfth Five Year Plan*, 2012-17. New Delhi, Government of India.

Powell, J M (2008) *The New Competitiveness in Design and Construction*. Chichester, Wiley.

Rogers, D (2016) “Property in the digital age: have we any idea what’s coming?” *Global Construction Review*, 15 March, [http://www.globalconstructionreview.com/perspectives/property-digital-age-have-we-an7y-id7ea-wh7ats /](http://www.globalconstructionreview.com/perspectives/property-digital-age-have-we-an7y-id7ea-wh7ats%20/)

Rwelamila, P D, Talukhaba, A A and Ngowi, A B (1999) “Tracing the African Project Failure Syndrome: the significance of ‘ubuntu’.” *Engineering Construction and Architectural Management*, **6** (4), 335-346.

Sambasivan, M and Soon, Y W (2007) “Causes and effects of delays in Malaysian construction industry”, *International Journal of Project management*, **25** (5), pp 517-526.

Schwab, K. (Ed.) *The Global Competitiveness Report 2015-2016*. Geneva, World Economic Forum.

Ssegawa-Kaggwa, J, Ngowi, A and Ntshwene, K (2013) “Using a situation analysis to identify the construction industry deficiencies in Botswana.” *Journal of Construction in Developing Countries*, 18(1), 1-18.

Stiglitz, J E (2004) “The Post Washington Consensus consensus.”Paper presented Foundation CIDOB and the Initiative for Policy Dialogue conference, “From the Washington Consensus towards a new Global Governance”, Barcelona, September, <http://intldept.uoregon.edu/wp-content/uploads/2015/03/Yarris-Joya-5.1.15-Brown-Bag-Article.pdf> [accessed on 9 May 2016]

Sugii, T (1998) The Construction Sector Suffers from Declining Labor Productivity. Industrial Research Department, NLI Research Institute, No. 117, pp. 18-26.

Thasarathar, D. (2016) “Change is the new normal, so what’s beyond BIM? *BIM+*”, 7 April, <http://www.bimplus.co.uk/people/change-new-norm5al-so-wha5ts-bey9ond-bim/> [accessed on 10 April 2016]

Transparency International (2012) *2011 Bribepayers’ Index*. Berlin.

Transparency International (2016) *Corruption Transparency Index 2015.* Berlin.

United Nations (2015a) *Millenium Development Goals Report 2015*. New York.

United Nations (2015b) *Resolution adopted by the General Assembly on 25 September 2015 – 70/1 Transforming our world: the 2030 Agenda for Sustainable Development*. New York.

Wates, N and Knevitt, C (1987) *Community Architecture: How people are creating their own environment*. Abingdon, Routledge.

Williams, M J (2015) “Bricks-and-mortar institutions matter: project delivery and unfinished infrastructure in Ghana’s local governments.” International Growth Center Policy Brief, November, [file:///C:/Users/bdgofori/Downloads/Williams-2015-Policy-brief.pdf](file:///C%3A/Users/bdgofori/Downloads/Williams-2015-Policy-brief.pdf) [accessed on 9 May 2016]

Windapo, A O and Cattell, K (2013) “The South African construction industry: perceptions of key challenges facing its performance, development and growth.” *Journal of Construction in Developing Countries*, **18** (2), 65-79.

Williamson, J (2004) “A short history of the Washington Consensus.” Paper presented at Foundation CIDOB and the Initiative for Policy Dialogue conference, “From the Washington Consensus towards a new Global Governance”, Barcelona, September 2004.

Zawdie, G and Murray, M (2008) “The role of construction and infrastructure development in the mitigation of poverty and disaster vulnerability in developing countries.” In Murray, M and Dainty, A (eds) *Corporate Social Responsibility in the Construction Industry*. Abingdon, Taylor and Francis, pp. 74-97.