ICED
Infrastructure & Cities
for Economic Development

Construction Capacity Framework

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Introduction

Why is it needed?

A country's construction industry is responsible for delivering the critical infrastructure that underpins human well-being and economic growth. In this context, construction activity needs to be appropriately planned, designed, built, operated and maintained to enable countries to achieve their development aims, including their objectives under the Sustainable Development Goals, Sendai Framework, Paris Agreement, and New Urban Agenda[1].

The construction industry attracts sizable public and private investment and, through its activities, makes a significant contribution to the economy. It also interacts with and enables most other industries across the economy and society. Whilst construction activity can be a key enabler of growth, the industry has a chequered history in terms of health and safety, cost and time overrun and the full realisation of benefits[2].

An efficient construction industry needs to operate within a stable economic and regulatory environment with individual projects and programmes managed within a defined development process.

However, the reality is that in many countries there are limitations in capacity (of people and institutions and the provision of materials and equipment), procedures (legal and regulatory) and access to finance. This leads to inadequacies in infrastructure project planning, implementation and operation and can adversely affect development outcomes, such as the effectiveness of infrastructure assets to safely support economic, environmental and social development.

1 References to Global Development Agendas:
The Sustainable Development Goals 2015 to 2030 sustainabledevelopment.un.org/sdgs
The Sendai Framework for Disaster Risk Reduction 2015 to 2030 unisdr.org/we/coordinate/sendaiframework
The Paris Agreement 2016 unfccc.int/paris_agreement/items/9485.php
The New Urban Agenda 2016 habitat3.org/the-new-urban-agenda/

What is it?

The Construction Capacity Framework (CCF) provides a structured approach to understanding the strengths and weaknesses of the construction industry in developing countries to help identify areas that could be strengthened to enable more effective infrastructure delivery and development outcomes.

Global investment in infrastructure assets is expected to double between 2015 and 2030[3], with the greatest need in developing countries seeking to remove existing constraints to growth, respond to the pressures of urbanisation and encourage inclusivity. Supported by the UK Department for International Development (DFID), the Infrastructure and Cities for Economic Development (ICED) facility recognises the significant and complex challenges faced by developing countries in strengthening their construction industries and has developed the CCF to support this process. ICED have made the CCF a publicly available framework and would strongly encourage others to adopt this approach to identify opportunities for strengthening the capacity of construction industries in developing countries.

2 For example, see Flyvbjerg, B., Bruzelius, N., & Rothengatter, W. (2003). Megaprojects and risk: An anatomy of ambition. Cambridge University Press

3 New Climate Economy. (2014), Better Growth Better Climate: Synthesis Report; McKinsey & Company. (2016), How to mobilize private sector financing for sustainable infrastructure

Who is it for?

The CSS is primarily intended to be used by people with a broad knowledge of the construction industry and access to a wide variety of stakeholders and key decision makers, in order for the resulting recommendations to be actioned. Any application of the CCF would benefit from the formal support of a body that retains long-term engagement in the relevant construction industry and in some sense takes responsibility for, or 'owns' the results.

The CCF has been designed to support line ministries or government departments, donor bodies supporting government capacity-building programmes, or industry development agencies[4] to understand the construction industry landscape and identify its strengths and weaknesses. This in turn helps to identify specific areas for further analysis and investment which require improvement. There is no quick fix – influencing long term improvements requires significant further planning, implementation commitments, and institutional commitment to promote changes.

As such the CCF is a useful framework for the following:

- Public and private sector investment decision makers
- Policy and programming leaders
- Project implementers and infrastructure operators

The CCF is a framework to support a structured way of considering the construction industry. As such it is not an application tool to score or rank a country's construction industry. Such an operational tool could be developed to support the application of this framework in the future.

4 Increasingly, countries are establishing construction industry development agencies to manage the continuous development of their construction industries, such as Ministries of Construction (e.g. China and Vietnam); government agencies (e.g. Construction Industry Development Board's in Singapore and South Africa, The National Construction Council, Tanzania; The Institute for Construction Training and Development, Sri Lanka); industry funded organisations (e.g. The Construction Industry Development Council, India); advisory organisations (The Construction Industry Board, UK).

What does it cover?

The critical objective of the CCF is to diagnose key weaknesses and identify areas where capacity to deliver quality infrastructure needs to be enhanced. The main focus is on assessing capacity issues at national level in developing countries, although it may also be useful in assessing capacity at regional and/or to assess capacity of particular industry sub-sectors. For example, the construction industry may have very different characteristics across the following sectors:

- Buildings (Education, Health, Housing Developments, Government Buildings, Industrial, Business and Commercial)
- Transport (Roads and Highways, Railways, Airports and Harbours)
- Utilities (Water, Energy, Telecommunications)

Previous examples of interventions aimed at strengthening aspects of the industry have often been undertaken without a broad knowledge of the relative strengths and weaknesses of the industry as a whole[5]. This limits understanding of the likely impact of individual interventions and may in some instances encourage fragmented solutions rather than continuous improvement over time.

In many developing countries, the implementation of complex and specialist infrastructure is often supported by the international market and is therefore not the intended focus for the CCF, e.g. heavy industrial services, international airports, nuclear power, or high security facilities.

Although the CCF is not intended to cover small scale projects such as private housing or commercial units, much of the content will be relevant to inform the key risks which may affect the successful implementation of individual projects.

5 Ofori, G. (2012). New Perspectives on Construction in Developing Countries. Spoon Press. London and New York.

The Framework

The CCF diagram

The term “construction industry” can mean different things in different places. There is no perfect industry. In many countries there are intentions and policies in place to develop the construction industry and improve its performance. National context is very important; no one country’s example of any aspect can be considered universally applicable “best practice”.

This diagram illustrates how the CCF structures the construction industry into three core pillars incorporating **Investment & Business, Legal & Regulatory, People & Organisations**, and centred around the specific **context of the country**.

Each pillar contains a handful of critical **elements** which can be considered separately to identify key areas of strength and weakness.

This report contains a double page spread for each pillar, comprising the critical elements, key considerations that should be in place, what “good” should look like, and a number of illustrative questions to understand what is actually happening in practice.

Context
the country specific context including sociocultural, economic and political influences, the physical environment, and the key stakeholders and decision makers

Investment & Business
the finance and funding of infrastructure, factors of production, and commercial operating environment

Legal & Regulatory
the policy and regulation, codes and standards which support and regulate the construction industry

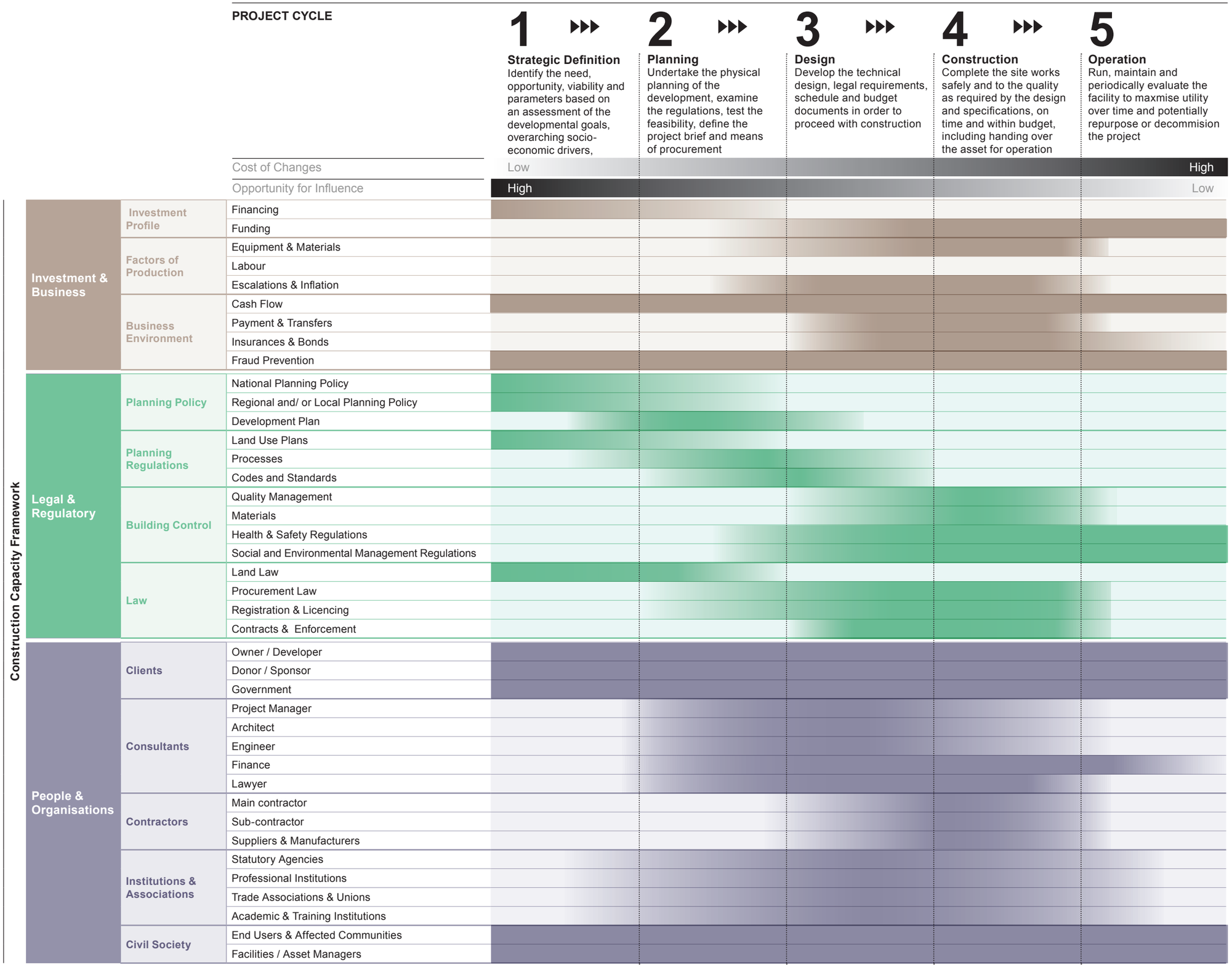
People & Organisations
the capability (skills) and capacity (quantity) of all stakeholders and organisations involved in the construction industry

The project cycle

Successfully achieving the planned benefits of an investment provides a strong indication of efficiency and effectiveness of the construction industry. Success relies on the capacity and capability of the construction industry to execute projects and programmes through the full project life cycle, from the early strategic definition stage through the planning, design, construction and operation stages.

This diagram defines the typical life-cycle of a project or programme and illustrates the importance of good decision making early in the process to influence project outcomes and reduce the risk of cost escalation. This shows that investing in capacity building at early project cycle activities is critical for achieving effective impacts. For example, the capacity to undertake key steps in the planning process (e.g. feasibility studies) is critical to prevent costly or unachievable changes during the design or construction stages.

This diagram also maps each element of the CCF which have varying levels of significance at different stages of the project cycle. This can help to inform capacity building in specific areas of the CCF which relate to critical stages in the project cycle.



Framework Pillars

Context

The construction industry varies from place to place and a core principle of the CCF is that the construction industry should respond to national conditions and demands in order to contribute to national development goals. Put simply, demand must exist for the industry to function – an economy in recession is less likely to address strategic strengthening of the construction industry. Each context must be understood and the boundaries defined in order to calibrate the application of the CCF.

This pillar collects key statistics and information about the economic, sociocultural, political, and geographical context which impacts the construction industry's ability to support national development goals. Some of the illustrative questions within the other three pillars could also start to be addressed here through the following five lenses:

Development goals

The ultimate purpose of strengthening the construction industry is to improve development outcomes through livelihood opportunities and economic growth.

Economic

The economic context will have a significant influence on the industry as it defines the demand and resources available to the industry. Economic and construction data should be understood at various levels:

- **National**
  GDP per capita, rate of economic expansion or contraction, inflation, interest rates, ease of doing business
- **Industry**
  output (e.g. floor area), level of demand, employment, earnings, hours worked, health and safety, productivity, relationship between Gross Value Added (GVA) and GDP (the Bon Curve), and the shape of the industry (i.e. the relative size of each sector within the industry)
- **Firm**
  structure, turnover, levels of profits
- **Project**
  costs, time, quality

Useful sources of information include:

- World Economic Forum country reports
- World Bank Ease of Doing Business
- World Bank open resource database
- Africa Development Bank Statistical Yearbook
- International Growth Centre

Socio-cultural

The socio-cultural context will have a bearing on how the industry operates, the nature of the workforce and the approach to construction. Consideration should be given to the following:

- demographics, education and language, ethnic and racial composition, power structures and social organisation, regional differences, religious beliefs and practices

Political

The political context will inform how the industry is regulated and operated, and how changes to the industry can be initiated. Consideration should be given to the following:

- political structures, formal institutions, and authority for decision-making and how power is exercised between them in practice
- governance cycles, institutional history
- political history and civil unrest or conflict

Physical

The size of the context being studied (e.g. geography, population etc) will influence the scale and density of the industry; the physical geography of the context (e.g. climate, natural hazards and resources) will influence the construction season and availability of raw materials.

Pillars	Elements	Considerations	What does "good" look like?	Illustrative questions to understand current practice
Investment & Business	Investment Profile	Financing	Industry should have existing and well-defined financing sources and funding streams. A stable, competitive and inclusive macro-economic environment will enable access to and attract a diverse range of financing. Macro-economic parameters which can be compared to similar markets include: GDP growth, inflation, capital controls, benchmark interest rates, import/export tariffs. A successful industry will have access to a broad range of sustainable financing sources including: public and private bonds, loans and guarantees; sovereign wealth funds; equity and pension funds; endowments and foundations; and donors. Well identified and reliable funding streams that follow international/high environmental and social (E&S) standards, will de-risk industry investments. The volume, location and timing of investment returns needs to be understood and funding streams targeted appropriately in response. A healthy range of funding streams should include direct taxation, revenues and user charges.	What are the economic conditions (e.g. GDP growth, inflation, capital controls, import/export tariffs, benchmark interest rates)? How have they changed in the last five years (i.e. are there significant fluctuations) and how do they compare to other similar markets (e.g. neighbouring countries)? What is the range of existing sources of finance (e.g. public debt, bank loans, private funds, donors)? How have sources of finance changed over the last five years (i.e. the volume, cost and timelines)? Does financing include any conditions in relation to social benefits (e.g. CSR requirements or IFC Performance Standards)? Do any incentives exist for achieving certain building performance criteria? (e.g. tax incentives for lower energy and water demand, funding incentives for "green" buildings, or feed-in tariffs for decentralised renewable energy generation?) What are the existing funding streams within the industry (e.g. direct taxation, project revenues and user charges)? To what extent are returns internalised (i.e. are the people who benefit, actually paying for these benefits)? How well can these funding streams be used to pay for ongoing use, periodic maintenance and debt repayments? How reliable are these funding streams and can they be adjusted? Are dedicated funds set up for building or maintaining buildings and infrastructure, such as an education or health trust, or road fund? Are these funds used for their original purposes?
		Funding		
	Factors of Production	Equipment & Materials	Industry should use technology which is appropriate in its context, but modern in its category. It should have access to the necessary machinery, equipment, materials and adequate qualified personnel in various professional and skills categories. There should be a balance between locally made and imported materials to minimise the burden on the terms of trade. Industry should understand and respond to the relative cost of equipment and machinery, and labour. Changes to these fundamentals and/or inflation and escalation should be monitored by the industry in order to adapt accordingly. Construction contracts should accommodate this changes and compensation accordingly.	What are the relative costs of equipment and materials, and labour? What are the productivity rates for the industry? How do these compare to other similar markets? What proportion of materials and equipment, and labour is sourced locally rather than internationally? Are construction companies able to acquire equipment and machinery? Are there incentive and assistance schemes to enable the purchase of such items? Does the industry have sufficient qualified persons in the various professional and skills categories? In which areas are there most serious shortages? Does the country have an adequate set of infrastructure, facilities and instructors in educational and training institutions to produce the personnel the industry needs? Are there any incentives for training? Does the industry have sufficient quantities of key construction materials? In which areas are there most serious shortages?
		Labour		
		Escalation & Inflation		How well tracked are changes in costs and how accurately have they been projected? How well understood are inflation pressures on all elements of equipment and materials, and labour?
	Commercial Operations	Cash Flow	Industry needs access to a range of short term credit markets, the ability to process payments in a timely manner, the ability to access a range of insurance provisions, and the capacity to secure performance bonds. Access should be provided for small and medium enterprises, new business etc. including women-owned construction related businesses. Robust and enforced anti-corruption and fraud prevention measures and enforcement mechanisms should be in place to reduce and isolate instances of corruption.	What is the range of existing sources of short term credit and what are the key constraints for business access to short term credit? How does this compare to similar markets? How easily can construction firms obtain a loan? What is the difference between the interest rate for a contractor and that for other business?
		Payment & Transfers		How quickly can electronic and cash payments be processed? What are the thresholds for lumpy payments (i.e. are there limits for payments above a certain amount)? How do these compare to similar markets? What are the delays in paying contractors for work done?
		Insurances & Bonds		What insurances are available (e.g. contractor's all risk, professional indemnity, public liability, latent defect, employer liability and building)? What types of bonds are available (e.g. bid bonds, performance bonds)? How widely are they used? How much do they cost? Are they available across the industry or are there restrictions? Do insurance premiums reward demonstrably sustainable or resilient infrastructure development? How does this compare to similar markets? What insurances are required (by law or by standard contracts) on projects?
		Fraud Prevention		Do anticorruption and fraud prevention measures exist at both national policy level, and through industry or sector specific controls? How effective are they at reducing corruption and fraud? Is there an effective enforcement mechanism? Are instances of corruption isolated or endemic? Is there a record of strong punishment against those guilty of corrupt and fraudulent behaviour?

Pillars	Elements	Considerations	What does "good" look like?	Illustrative questions to understand current practice
Legal & Regulatory	Planning Policy	National Planning Policy	During the strategic definition and planning stages, the industry should be guided by sustainable and inclusive national/regional development agendas. These policies and plans should provide appropriate, realistic and achievable guidance to the industry on national growth policy, development plans, infrastructure pipeline, environmental and sustainability policies, housing and construction plans. National level policy should provide a strong and clear framework in order to support the development of implementable local planning policies at city or site wide scale, and provide an accurate picture of the type, magnitude and timing of major projects. They should set high standards for maximising environmental, economic and social benefits and minimising risk and adverse developmental impacts resulting from projects.	Does a national policy and/or development plan exist that directs growth and sets out a clear 5 year plan and longer term development vision? Is this cascaded into practical policy at the implementable level with practical guidance on how this could be achieved? How well is this adhered to? What are the challenges? Are planning policies formulated using up to date information, e.g. climate and natural hazard data, population demographics and urbanisation trends, socio-economic contexts, future demand on environmental resources, loss of natural capital?
		Regional and/ or Local Planning Policy		
		Development Plan		
	Planning Regulations	Land Use Plans	During the planning and design project stages, the industry should respond to appropriate planning regulations and be required to obtain consent from the planning authorities prior to construction. These regulations should address: land ownership/acquisition, customary law, resettlement planning, land use zoning; form based guidance; site planning and design, movement and accessibility, architectural style, proximity to associated infrastructure, e.g. transport, asset performance, structural stability, durability, buildability, material specifications, lighting, ventilation, and fire safety. An inclusive and transparent approvals process should engage both technical stakeholders and communities throughout.	Do land use plans or zoning regulations exist? Are they easily available? Were they informed by a participatory consultation process? Are they actively used and adhered to? How are they enforced? How are valuable land types protected (e.g. farming, nature reserve, etc.)? Are there any powers for public bodies purchase land required for development in a fair and transparent way?
		Processes		Is there a clear and streamlined planning approvals process? How many steps are required to obtain all the permits for constructing a simple building? How many days does it take to complete the entire process? Do all potential builders apply for approval? Are there illegally constructed buildings? What happens to such items? Are there systems for monitoring and enforcement? Are there opportunities for bribery within the planning approvals system? What is the mechanism for mitigating the impact of development and is this implemented successfully?
		Codes and Standards		Do building codes exist? When were they formulated? Do they reflect the up to date context specific user needs including accessibility, loads, climatic conditions, natural hazards, material properties, and structural typologies typically used in construction? Do they include vernacular construction typologies and local materials? Are they accessible and easy to use? How well are they followed? Do any building performance codes exist, which give energy or water performance criteria? Are design codes or frameworks used? Do they lead to high quality architectural and urban design outcomes?
	Building Control	Quality Management	During the construction stage, the industry should adhere to the building regulations which are enforced by building control. This includes the ability to regulate construction activity, material usage, health and safety, and environmental impacts. There should be appropriate and consistent guidance on what is required by building control, the ability to inspect performance on site, and the means to enforce these regulations. Consultations with affected people and end users should take place throughout the planning, design, construction and operation stages to manage environmental and social risks	Is there a clear process for checking construction work against the approved design? How well is this process adhered to? How frequent are site inspections and at what stages of construction? How well are violations enforced or rectified? Are there grievance mechanisms in place for whistle-blowers to raise concerns?
		Materials		Is there a process for material certification for all materials used in construction? Is there a laboratory to test materials' compliance? How well are checks conducted on site to ensure materials meet the design specification – such as the tests of piles, and concrete cube samples?
		Health & Safety Regulations		Are there clear regulations for construction site health, safety and welfare of workers with necessary provisions for female workers (facilities etc.)? How are they checked on site? What measures are taken to enforce them? How effectively are incidents, accidents and abuse being reported? What action is taken after such an incident?
		Social and Environmental Management Regulations		Is there a law requiring than an Environmental Impact Assessment to be undertaken for projects? How comprehensive and of what standard are Environmental Monitoring Plan's in the country? How well are they enforced? Do any environmental certification schemes exist? What is the uptake? How much weight do they carry in the market?
	Law	Land Law	Throughout the project life cycle, industry should be governed by a fair and accessible legal framework which is administered by an effective enforcement mechanism. This includes land law to ensure the land tenure spectrum operates smoothly; procurement law to enable fair inclusive and competitive tendering; bidding processes that require/ promote and lock in benefits for affected communities; licensing of contractors and consultants (including for women-owned businesses and small and medium enterprises), and an effective means of dispute avoidance or resolution	Is there land tenure spectrum clearly defined and understood? Can land titles be transferred smoothly?
		Procurement Law		Are there laws governing the procurement process? How do they address competitive bidding (e.g. prequalification and value rather than cost), fair employment (e.g. equal opportunities and avoidance of child labour), subcontracting (e.g. by limiting the number of layers), and timely payments? How these laws are generally enforced?
		Registration & Licencing		Are contractors licensed? How is it organised (e.g. competency and/or size based)? What are the requirements for classification (by type of work) and categorisation (by limit of size of project it can tender for)? Are there different requirements for foreign companies? Are professionals licensed? Which are the professions which must be licensed? What percentage of projects employ registered consultants and licensed contractors)? Is there a process for blacklisting or revoking licenses based on performance?
		Contracts & Enforcement		Is there a variety of standard forms of contract available and authorised, e.g. which promote collaborative ways of working? Is there a means of contract enforcement and dispute resolution? To whom is it accessible and what are the stages (e.g. mediation, arbitration, litigation)? How well are these adjudications enforced?

Pillars	Elements	Considerations	What does "good" look like?	Illustrative questions to understand current practice
People & Organisations	Clients	Owner / Developer	The client can be defined as the owner/developer, donors/development partners, or government bodies responsible for commissioning building or infrastructure projects. The client is responsible for the overall management, procurement, and successful implementation of the project, ensuring it is conceived to meet appropriate developmental needs, coordinated with other planned projects, and that a competent team is appointed to deliver it.	Is there sufficient capacity within the developer, government or development partner organisations to fulfil their role in meeting the building and infrastructure needs? Do clients recognise whole life value rather than capital cost? Is quality assessed in addition to cost in the decision making process? Is the financial planning for projects robust; are there adequate funds to support every project launched? Do clients support research and development to improve the performance of the construction industry? If needed, is technical assistance provided by development partners for project management (administrators and supervisors) and to financial institutions, as well to consultants and contractors? Is this supported by independent supervision and audits? Are new projects conceived, planned and designed in line with government policies and development strategies, including those related to labour, environment, gender, inclusion and use of local materials, and coordinated with other infrastructure projects and existing assets? Is information shared between government departments? Is there effective coordination between government departments, and between ministries and government agencies (e.g. roads authorities, investment boards) Are roles and responsibilities of owners, development partners, ministries, departments and agencies clearly defined (including for environmental and social safeguarding)? Is there sufficient capacity and capability to carry out these roles effectively?
		Donor / Sponsor		
		Government		
	Consultants	Project Manager	Consultants provide management and technical expertise to support the financing, procurement, design, quality assurance and management of building and infrastructure projects. Consultants are responsible for supporting the client to define the project brief, carry out project designs in accordance with the brief, and provide a safe and resilient solution which meets the initial developmental need, and maximises the longer term development impact of the project.	Are there sufficient technical skills, knowledge, and capacity within the architectural, engineering, financial, and legal consulting organisations to meet the demand for and timely delivery of buildings and infrastructure projects (e.g. as defined by the development plan and infrastructure pipeline)? Does this knowledge include construction management and project management? Do available skills cover seismic design, material availability, available construction technology, the socio-economic conditions and environmental requirements? Is environmental sustainability and resource efficiency a key design principle for design teams? What proportion of practicing consultants have a relevant university qualification and registered under a recognised licencing scheme? What proportion of consultants are professionally qualified?
		Architect		
		Engineer		
		Finance		
		Lawyer		
	Contractors	Main contractor	Contractors are responsible for implementation of buildings and infrastructure on site, which should comply with the design intent as shown on the construction documentation. All site works and tender processes should comply with quality, health and safety, environmental, and social requirements and safeguards against child and sexual exploitation. The contractor base should be diverse (e.g. women owned, small to medium size contractors etc.) to be able to respond to a wide range of different project requirements. Contractors typically play a key role during the construction stage, but should also be included in the planning and design stages to ensure the design provides a sensible and buildable solution. There are usually a number of sub-contractors and suppliers with responsibilities for specific tasks and managed by a main contractor. Sub-contractors should be able to work collaboratively and absorb technology transfer from larger firms. The supply chain should be engaged during the design stage to ensure the appropriate quality and quantity of materials and construction technologies is available.	Are there sufficient (quantity and quality) local main contractors with the experience and capacity to manage the projects in the infrastructure pipeline or development strategy? What proportion of projects are managed by international contractors? Do international firms employ significant numbers of local staff? What proportion is undertaken by joint ventures between foreign and local firms? Does the presence of international firms stifle or enhance the local contractors' opportunities for development? Do contractors have appropriate checks in place as part of the recruitment process (e.g. do they employ only registered workers)? Do contractors have a code of conduct for all staff with punitive measures/zero tolerance for violations? What due diligence checks are in place to safeguard against incidents of abuse (e.g. gender based violence and child exploitation)? Do contractors provide training opportunities for staff in technical skills, management (e.g. construction, finance, contract, environmental and risk management) and soft skills (e.g. social safeguarding and staff welfare, health and safety)? Do contractors invest in research and development to improve processes and technologies they use to support project implementation? How effectively do domestic-owned contractors learn and process technology transfer from foreign-owned contractors? Are there any incentives for contractors to properly manage construction waste and other impacts? Are there any penalties for firms which fail to do so?
		Sub-contractor		Do subcontractors provide the level of skills and expertise needed to support main contractors in the delivery of building and infrastructure projects? What are the main gaps in expertise?
		Suppliers & Manufacturers		Is the supply of materials, plant and equipment sufficient to meet the demand? Does the quality of materials, plant and equipment being supplied meet the national standards and industry requirements? How has the supply of construction products and technologies changed and/or been innovated? Is there maintenance support for plant and equipment supply?

Pillars	Elements	Considerations	What does "good" look like?	Illustrative questions to understand current practice
People & Organisations (continued)	Institutions & Associations	Statutory Agencies	Statutory agencies, professional institutions, trade associations, and academic and training institutions play a critical support role in providing adequate skills and capacity to the client, consultant and contractor bodies, and provide technical oversight and quality assurance. They also have an important role in communicating information to the general public, as well as setting and upholding standards of conduct and practice, especially for environmental and social safeguarding (e.g. reducing risk of exploitation and child labour). In some cases, construction industry agencies exist to manage and develop the construction industry.	How well defined is the role of each of the statutory agencies in administering aspects of construction such as providing quality assurance checks and approvals, and health, safety, environmental, and social risk management? Are the activities of the different agencies co-ordinated? Do the statutory agencies have the capacity to carry out the checks and provide the approvals on each project at the required stages and frequency? Is there sufficient technical training provided to the staff of the agencies to fulfil the role effectively? How often are site checks undertaken? How many unregistered projects are there? Is construction quality a concern? Is there a construction industry authority with a mandate to manage and develop the capacity of the industry? Does it have a constitutional or legal ability to influence change? What has it achieved?
		Professional Institutions		Are there professional institutions for architectural, engineering, construction, project management, financial, and legal professions? Do they have the following objectives; ensuring qualifications, maintaining standards or practice, guiding and enforcing attainment of ethics, and safeguarding the welfare of members and the interests of society? Do they have accreditation schemes which are benchmarked or affiliated with international best practice? Are capability assessments competency based?
		Trade Associations & Unions		Are industry associations actively promoting collaboration and shared learning opportunities? Are independent trade unions established to protect the interests of construction workers? Are the rights of workers to join trade unions guaranteed under the law? Have the unions been advocating for decent work5 for the construction labour force (a fair income, productive work, safe work, secure employment, prospects for personal development and social integration, and equal treatment for men and women)? How effective have the trades unions been in these regards?
		Academic & Training Institutions		Can academic and training institutions provide sufficient numbers of personnel at all levels (trade, supervisory, technician, graduate, and professional)? Do the courses and curricula cover the technical and personal skills required? How much attention does innovation receive? Are climate and environment issues included in part of the curriculum of relevant institutions?
	Civil Society	End Users & Affected Communities	End users, affected communities and asset managers have a vested interest in the service provision and performance of the infrastructure or building asset. In order to enhance the impact of the asset these groups should be consulted during the strategic definition stage, and remain involved throughout the project cycle to inform the design and implementation decisions and so that they understand how the asset operates and how it should be maintained.	Are representative groups (including minority and vulnerable groups) consulted throughout the project cycle (particularly during strategic definition and project planning)? Are consultations carried out in line with national standards and the International Finance Corporation environmental and social performance standards6? How are affected communities informed of project progress? Is a website set up for each significant project for stakeholders to follow the progress and give comments? Are processes in place to ensure ideas and concerns of end users and other stakeholders are recorded and considered in the development of projects? Is there a system in place for setting, monitoring and revising user fees for the facility which includes end user consultations? Is there an established handover process in place so that end users and asset managers are aware of any snagging items, and how to use, operate and maintain the asset? What is the duration of the defects liability period? How is the final account for the project prepared and agreed? Are user / maintenance manuals and associated training a mandatory part of the handover process? How common is the appointment of facilities' managers to manage ongoing efficient operation for built assets? Is there a law requiring designers and builders to be liable for defects in the building for a period of time?
		Facilities / Asset Managers		

5 International Labour Organization (2017) Decent work, ilo.org/global/topics/decent-work/lang--en/index.htm

6 ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/Sustainability-At-IFC/Policies-Standards/Performance-Standards

Application of the CCF

Principles of a qualitative diagnosis

The CCF is intended to provide a common understanding of the construction industry informed by the perspectives of multiple stakeholders. This relies on gathering information and stakeholder opinions and presenting the results to form an understanding of the strengths and weaknesses of the construction industry. It is not a quantitative tool nor does it provide a normalised benchmark to rank or compare construction industries in different countries.

The following key principles are intended to promote a robust and consistent diagnostic and avoid limited or biased perspectives. Additional user guidance to help apply these qualities and avoid subjectivity is provided overleaf.

Calibration
the CCF should be considered within the specific national, regional, or sectorial context. An identification of the key stakeholders, and initial consideration of the pertinent elements and illustrative questions to focus on should be made

Strategic
the CCF seeks to identify key strengths and weaknesses of the industry. It is not a comprehensive diagnostic of all aspects of the industry. The user must explore the extents of the industry but focus their inquiry and analysis on specific aspects that emerge in the early stages of the diagnostic

Feedback
the CCF should be useful to the stakeholders that contribute to the diagnostic and would benefit from their review of the results. Findings and feedback can be offered to the participants in the form of a key findings presentation, report or workshop

Practical
the CCF outlines what should happen in theory but also seeks to understand what actually occurs in practice. For example, policy may define what exists in theory or should happen but the diagnosis must uncover the custom and practice of what normally occurs

Prioritise
there are too many stakeholders involved in the industry to speak to all of them. Stakeholder mapping should target individuals and organisations in the country's construction industry that represent the range of industry actors in order to prioritise consultations

Triangulation
it is assumed that data (empirical, quantitative and qualitative) will be incomplete and/or contested. Therefore, triangulating data by consulting multiple data sources or informants will be essential to ascertain more accurate results. In particular, stakeholder perceptions need to be cross referenced and ideally compared to objective sources

Sensitive
the industry is subject to political agendas, competing interests, institutional friction and has a direct impact on stakeholder livelihoods. The user must be sensitive to these realities which may influence the willingness of different stakeholders to engage with each other or speak openly about their role in the industry, or fairly about the roles of others

The CCF provides a structure for engaging key stakeholders from a variety of perspectives to build a comprehensive understanding of the current situation, and the strengths and weaknesses of the construction industry.

Whilst the CCF does not provide a user interface tool for application, the following three-staged approach is recommended for using the framework to identify opportunities to enhance capacity or capability:

Parameters & set up

The parameters of the industry under consideration and how it contributes to the countries' development goals must be defined. This includes the geographical extents (national, regional, city scale); the sectors (buildings, transport, utilities or all); the duration of the study which will inform the level of detail which can be achieved; stakeholder mapping to identify a comprehensive range of people and organisations; agreed objectives and institutional commitment from key decision makers and influencers; continued development goals and intended contrivutions from the construction industry; and an overarching contextual analysis to inform an initial impression of the wider political, economic, and sociocultural environment which impacts the construction enabling environment.

In addition, the key elements and illustrative questions must be calibrated, i.e. allow the user to identify which aspects of the industry to focus on. For example, if the industry is dominated by road construction with very little residential construction then it's worth exploring how well road construction is performing and why so little residential construction is undertaken. Or if there is no requirement for Environmental Impact Assessments then there's no need to understand how well they executed, but instead it is worth asking if there's any demand for them and how they might be useful.

Stakeholders

A stakeholder mapping activity is critical to identify the key people and organisations and understand how they relate to each other. Typical lines of enquiry should include:

- How do strong or poor stakeholder relationships affect the industry?
- Is there an apex industry organisation which brings all professional institutions and trade associations together? Are there regular meetings of stakeholders? Are the conclusions and recommendations of such meetings taken into consideration in formulating policies?

Initial targeted stakeholder consultations will be critical to inform this stage and achieve buy in from key decision makers. These initial consultations should complement desktop research to inform the elements within the parameters and set up stage.

Data collection & consultation

The content, format and sequence of consultation and data collection needs to be designed in response to the parameters of the study, the context, and the nature of the stakeholders.

Data collection can take place both independently from, and as part of the consultations. Data inputs are important to both inform the consultations, and verify the key findings arising from the consultations. The availability of information is a critical consideration in itself, for example, when considering how accessible the regulatory documents are this can be verified through the process of obtaining copies, and then reviewing them for quality and appropriateness. Desktop research can help identify what should be happening, but this may be different from what is actually happening in practice which is critical to triangulate this through the consultations.

Consultations may need to be conducted in multiple locations around the country. The nature of the consultation session will depend on the level of data already available and the ability to convene multiple stakeholders simultaneously. The following methods are often effective:

- **Workshops**
  Multi-stakeholder groups of more than ten people to work collectively and/or in small groups in response to questions or scenarios posed by a workshop facilitator. This could be a useful way to triangulate information and enable a variety of perspectives to be evolve together. It could also provide a useful way to generate an overarching understanding at the outset, and provide a feedback loop towards the end of the assessment process.
- **Focus groups**
  Specific stakeholder groups of less than 10 people to concentrate on a particular pillar, element or other issue. For larger stakeholders (e.g. government ministries, or contractor representatives) this may be an efficient means to harness opinions from various people with similar perspectives.
- **Semi-structured interviews**
  Conducted with individuals or very small groups to ask open questions and allow informants to describe their personal understanding of specific aspects of the construction the industry. It provides an opportunity for participants to speak anonymously or off the record which may reveal informal and unofficial information more effectively than the methods above involving groups. This method is very useful for triangulation.

All data sources and consultations should be documented through registers, and written/audio/visual records considering sensitivity to anonymity.

Consolidate & report production

The consultation records should be consolidated and triangulated to identify (in)consistencies that reveal the strengths and weaknesses of the overall industry and specific elements or considerations to be prioritised for investment in capacity building. Areas for prioritisation for further analysis should become clear as a result of the analysis of the elements through the illustrative questions

It is recommended that this is summarised in a Key Findings and Recommendations Report and also presented graphically to highlight priority elements and pillars which need strengthening.

Appendix

Developing the CCF

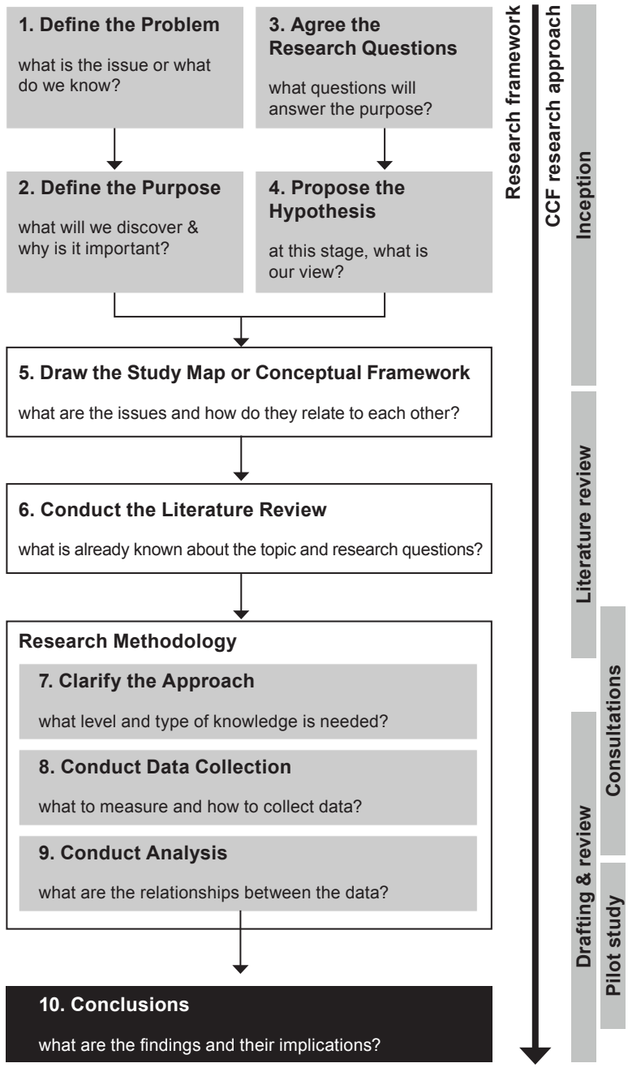


Figure 1: CCF development methodology mapped against the research framework adapted from Latham, J.R (2014) The Research Canvas: A Framework for Designing and Aligning the "DNA" of Your Study.

The CCF research approach based on the research framework as shown in Figure 1. This adopted the following five phases:

1. Inception
2. literature review
3. Consultation
4. Drafting and review
5. Pilot

The CCF is a draft framework, with further iterations anticipated following a planned pilot country study, and ongoing reviews and feedback are encouraged from additional users.

Inception

An inception workshop was held with the core team to review, brainstorm and agree the parameters of the research and development of the CCF (including the definition of the problem and purpose of the research). The focus on Low Income Countries (LIC) was expanded to include Lower Middle Income Countries (LMIC), recognising that the breadth of the CCF will be equally applicable to LIC and LMIC, and this would also increase the potential use and usefulness of the CCF. The discussion about 'sector' or 'industry' acknowledged that these terms are used interchangeably but that this research would adopt industry as it is a more widely used term. This research defines the construction industry in the broadest sense that includes demand, inputs, finance and regulation in addition to the more common narrow definition which focuses on contractors, consultants and clients.

The research questions were also agreed as:

1. How has the construction industry been categorised and how should it be categorised?
2. How is the construction industry different in developing vs developed countries?
3. What characterisitcs constitute a 'good' construction industry?
4. How can the construction industry be measured?

Literature review

A literature review was conducted in order to identify the current status of existing knowledge and knowledge gaps in relation to construction capacity strengthening in developing countries. Project contributors identified 31 recommended input documents which were supplemented through a traditional literature search producing an additional 66 documents. A full list of these reference documents is included at the end of this section.

The literature search was conducted on 5-6th July 2017 using google.co.uk and scholar.google.co.uk. Initially the literature search was used to identify the relevance of industry versus sector, and the existence of knowledge in relation to developing, low income or lower middle income countries. Figure 3 below indicates that the term "industry" is more widely used than the term "sector", and also illustrates the dominance of the term "developing countries" over "income" related terms. This confirmed the initial decision to adopt the term "industry" instead of "sector" and to broaden the research beyond low income countries. The quantitative aspects of the literature search also revealed the relative lack of knowledge about performance indicators for the construction industry which is an area the CCF Framework seeks to address.

The first 20 hits for each search were reviewed for relevance which resulted in 66 documents being shortlisted for reference. The abstracts for these documents, and those recommended by the project contributors, were reviewed and their relevance ranked against the four research questions in addition to subjective rank based on the reputation of the author and number of citations. This produced a list of 11 core documents which were reviewed in detail and 17 secondary documents which were also reviewed but in less detail.

The knowledge extracted from the literature review was used extensively to inform the structure of the CSS. The three pillars, context, elements, description of what good looks like, and illustrative questions were all derived from this review The highlights of this literature review are:

1. How has the construction industry been categorised and how should it be categorised?

The primary lenses used frequently in the literature are:

- By actor (e.g. firms in the value chain) which is fragmented and complex as the actors vary widely by project, location and phase
- By sector (e.g. transport) which can be aggregated or more detailed from two to more than a hundred categories
- By process (e.g. planning) which is the most consistent category used in all projects

The other categorisations found in the literature include by finance source, by era, by demand source, by impact on development and / or impact on GDP. The literature review highlighted the significant of construction as a 'horizontal industry' which impacts all aspects of the economy. However, in the literature there is a lack of comparative analysis between construction and other industries.

2. How is the construction industry different in developing vs developed countries?

The following general differences between developed and developing construction industries were identified in the literature

- Type of infrastructure: developing countries will require more new and greenfield projects and affordable housing by comparison to developed countries which will need to address serviceability of existing infrastructure and an aging population
- Expenditure: varies from about 2 – 10% of GDP depending on income status. This tends to peak in middle income countries and decline in share but not necessarily in volume for developed countries
- Finance: is significantly drawn from public and donor sources in developing markets but increasingly private and domestic in developed markets
- Factors of Production: tend to be labour intensive in developing countries and capital intensive in developed countries
- Contractors: developing markets tend to include foreign contractors and small domestic ones. Whereas developed markets tend to include a range of mostly domestic contractors but globalisation has had a significant impact on this trend
- Capacity and Capability: both markets lack management capacity and/or capability but developing markets tend to also lack technical capacity
- Process and Procurement: may be unclear and inappropriate in developing markets in contrast to established and cumbersome in developed markets
- Planning and Risk: developing countries may be described as higher risk with low project development capacity. Whereas developed countries are considered low risk but high profile projects are politically exposed

These differences are summarised by George Ofori when he states, "…in the developing countries, these difficulties and challenges are present alongside a general situation of socio-economic stress, chronic resource shortages, institutional weaknesses and a general inability to deal with the key issues. There is also evidence that the problems have become greater in extent and severity in recent years"

3. What constitutes a 'good' construction industry?

A wide variety of characteristics are identified in the literature which, in no particular order, includes:

- Finance: which is diverse, decentralised and large in volume
- Innovation: in technology, materials and tools, and which can be adopted and applied at scale
- Coordination: to overcome fragmentation, bolster the role of professional and industry bodies, and increase integrated delivery
- Reputation and Civil Society: construction industry perceived as good quality and an attractive employer which encourages participation in the design process
- Codes and Regulations: with government commitment to promote the industry and foster appropriate monetary policy, interest rates, imports, technical standards (design, construction and materials), health safety and welfare standards, environmental standards, diversity and equality standards, contract enforcement, and procurement processes
- Clients: who are quality and value orientated, and support innovation
- Sustainability: which is mainstreamed and more aware of hazards including climate change
- Responsibility: which is shared across the industry and continues during the life of the building
- Human Capital: which is continually trained – especially in management and linked to strategic opportunities
- Competitive: both domestically and internationally with limited barriers to entry but a healthy rate of firm births and deaths
- Quality Control: upheld through registered contractors and consultants, accredited workers and external recognition

One criticism identified and acknowledged in the literature is a tendency to present 'laundry lists' of goals or characteristics of what good looks like. The CCF seeks to help stakeholders prioritise these goals by focusing on the strengths and weaknesses of the construction industry.

4. How can the construction industry be measured?

A multitude of indicators are identified in the literature, including:

- Cost: total annual expenditure globally projected to grow form $3 trillion today (approximately 6% of global GDP) to $15 trillion by 2025 and by income classification (e.g. currently only $150 billion per annum in LIC). Useful ratios identified include percentage net variation to final cost, net present value to annual depreciation, and GVA to GDP
- Time: the speed, duration and variation of construction schedules
- Quality: subjectively measured in terms of functionality and satisfaction
- Sector: volume of floor area or expenditure varies widely for housing, infrastructure, institutional and commercial, and industrial
- Output: can be measured in terms of productivity, floor area or expenditure
- Jobs: construction employs more than 100 million people globally. A 1% increase in GDP represents 3.4 million jobs in India. Other useful indicators include the number of registered contractors and the percentage of 'PAYE' workers in the industry
- Finance: percentage of private finance needs to increase. Similarly, only 15% of ODA is spent on infrastructure. Another useful measure is government grants per square metre of construction
- Default Rates: despite the high risk reputation construction defaults globally are approximately 1.5% which is comparable to corporate debt
- Environmental Impact: construction industry is responsible for 50% of global carbon dioxide emissions. Also of note is the percentage of waste which is reused or recycled.

The abundance of potential measurements identified in the literature can be overwhelming and in many cases their use is inhibited by inadequate data. The CCF does not attempt to prescribe quantitative benchmark metrics as this would require significant further research. A qualitative approach is adopted, similar to maturity models.

Search Term	Hits	
	Google Normal	Google Scholar
Industry or Sector	**4,860**	**65**
“Construction + Sector + Developing Countries”	10	5
“Construction + Sector + Low Income Countries”	0	0
“Construction + Sector + Lower Middle Income Countries”	0	0
“Construction + Industry + Developing Countries”	4,850	59
“Construction + Industry + Low Income Countries”	0	0
“Construction + Industry + Lower Middle Income Countries”	0	0
General	**35,674,000**	**12,916,600**
“Construction” + “Industry” + “Strategy”	6,860,000	3,310,000
“Construction” + “Industry” + “Capacity”	12,800,000	3,340,000
“Construction” + “Industry” + “Structure”	12,900,000	3,520,000
“Construction” + “Industry” + “Performance Indicators”	454,000	96,600
“Construction” + “Industry” + “Classification”	2,660,000	2,650,000
Developing Countries	**2,321,700**	**1,860,300**
"Construction" + "Industry" + "Strategy" + "Developing Countries"	687,000	497,000
"Construction" + "Industry" + "Capacity" + "Developing Countries"	688,000	367,000
"Construction" + "Industry" + "Structure" + "Developing Countries"	702,000	803,000
"Construction" + "Industry" + "Performance Indicators" + "Developing Countries"	61,700	22,300
“Construction” + “Industry” + “Classification” + “Developing Countries”	183,000	171,000
Low Income Countries	**228,600**	**100,440**
"Construction" + "Industry" + "Strategy" + "Low Income Countries"	61,700	27,100
"Construction" + "Industry" + "Capacity" + "Low Income Countries"	63,000	27,400
"Construction" + "Industry" + "Structure" + "Low Income Countries"	61,700	28,600
"Construction" + "Industry" + "Performance Indicators" + "Low Income Countries"	25,700	2,140
“Construction” + “Industry” + “Classification” + “Low Income Countries”	16,500	15,200
Lower Middle Income Countries	**67,770**	**11,248**
"Construction" + "Industry" + "Strategy" + "Lower Middle Income Countries"	20,100	2,900
"Construction" + "Industry" + "Capacity" + "Lower Middle Income Countries"	20,500	2,990
"Construction" + "Industry" + "Structure" + "Lower Middle Income Countries"	20,600	3,190
"Construction" + "Industry" + "Performance Indicators" + "Lower Middle Income Countries"	1,990	278
“Construction” + “Industry” + “Classification” + “Lower Middle Income Countries”	4,580	1,890
Total	**38,296,930**	**14,888,653**

Figure 3: Literature search terms and hits.

Consultations

Semi structured interviews were conducted with key informants to complement the literature review, clarify the research approach, gather data and explore how the CCF could be useful to practitioners (see Figure 2 below). Key informants were deliberately spread across the research community, industry development authorities, professional bodies, donors, and included potential end users. Each interview was approximately one hour and conducted by Joseph Stables and Darren Gill. Interview questions were adapted from the research questions and focused on particular areas of expertise relevant to the key informant. The interviews were audio recorded and notes taken (but not transcribed) which were used to inform content of the CCF.

A list of consultations carried out to date is provided overleaf.

Drafting and review

The CCF was primarily drafted by the core team with input from cross cutting specialists in climate and environment, and gender and inclusion. The initial proposition for the CCF was issued as a scoping report to the quality assurance reviewers, DFID and the advisory group in order to confirm the research approach, communicate initial findings and seek critical feedback. The principle feedback at this stage was that the CCF should focus at the industry rather than project scale and that the project life cycle should not be used as the central organising device.

The revised CCF adopted the three pillars as the primary organising device and added detail within the elements and illustrative questions based on specialist technical review and insight from a wide variety of reviewers within Arup. This draft is currently being reviewed by DFID, the advisory group and the key informants who all asked to be included as the CCF is developed further. This feedback and comments will be incorporated into the next draft of the CCF.

Pilot study

A pilot study in Uganda was conducted in January 2018 to test and refine the CCF. That report, ‘Uganda Construction Capacity Preliminary Assessment: Key Findings and Recommendations’ is a stand alone report but also provides a case study to complement the CCF. The Uganda pilot utilised the CCF as a means to structure the assessment and reporting. It focuses on the roads sector and draws technical conclusions about the industry more broadly. Revisions to the CCF were informed by the effectiveness of its application in Uganda.

Contributers

The CCF was developed through the DFID ICED facility by a core team, with specialist input from a wider support team, and expert review from Arup technical experts. Consultations were held with recognised industry experts from across the world, with additional feedback through an advisory group. See Figure 2 for a full list of project contributors, their roles and affiliations.

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	Tim McMinn / Nina Nasman	ICED Delivery Lead	PricewaterhouseCoopers
	Kewpie LH Wu	Framework Functionality	Arup
	Petter Mathews	ICED SMT Lead	Engineers Against Poverty
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	Jo da Silva	Quality Assurance Reviewer	Arup
	Jill Wells	Quality Assurance Reviewer	Engineers Against Poverty
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	Dr. Rodney Milford	President	Construction Industry Development Board, South Africa
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	Debbie Clarkson	Health and Safety Expert	Arup
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	Bruce Keith	Infrastructure and Environment Advisor	President and Trustee, Chartered Institute of Water and Environmental Management
	Annabel Fleming	Construction Programming Advisor	Engineers Without Borders
	Steven Crosskey	Infrastructure Resilience Advisor	United Nations Office for Project Services
	Andreas Mella	Development Advisor	Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ)
	Edmunco Werna	Construction Sector Advisor	International Labour Organization

Figure 2: Project contributors, their roles and affiliations

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