Infrastructure and the Millennium Development Goals: A Framework for Enhancing the Efficacy of the Role of the Construction Sector

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1 Introduction

The sustainability movement has, since its unofficial inception in 1962, the year of Rachel Carson's seminal work *Silent Spring,* made significant progress in advancing arguments for the conservation of the earth's natural resources. Many of you will recall that the early focus, and perhaps the power behind the essentially "green" movement in those formative years, was the growing opposition to pollution. Over the ensuing 40 years, the so-called "green" environmental agenda grew and transformed into the so-called "brown" social agenda although concerns about governance did emerge very early, much to the credit of the environmental movement. A brief time-line tracking key moments in the sustainability movement from the early 1960s reveals the emerging of the following milestones: governance (1970), biodiversity (1973), the ozone layer (1974), indigenous peoples (1977), economics (1982), toxins (1984), poverty (1988), security (1990), climate change (1992), and population (1994).

Some key global resolutions emerged in parallel, including the landmark Habitat meeting and its subsequent implementation programme, Agenda 21. To this has recently been added the Millennium Development Goals, in recognition of the momentous opportunity to capture the transition from the 20th century to the 21st century.

Agenda 21 is one of the first policy documents to address changing consumption and production patterns (Chapter 4) and to make reference to the role of the construction sector in achieving sustainable development imperatives (Chapter 7 (G)). It remains a ground-breaking policy document, especially as it was the first to recognise the causal relationship between resource use and benefits generated, and articulated the need for "*new concepts of sustainable economic growth and prosperity"*.

2 Background to the Framework

The Commonwealth Association of Architects resolved to make its contribution to the new millennium through the development of design guidelines that could assist the 40,000 architects that constitutes its Commonwealth membership (nearly 80% of whom are in developing countries) in its capacity as an 'Institute of Institutes'. Accordingly, the CSIR in South Africa was commissioned to prepare the guidelines, a process that resembles a Tolkien-tale, i.e. it grew in the telling. From the original proposal for a 95 page paper manual, it is now 475 page electronic library. The research underpinning these guidelines have substantially contributed to the drafting of this framework.

3 Need

Agenda 21 Chapter 7(G) identifies two simple but significant objectives: "*The objectives are, first, to adopt policies and technologies and to exchange information on them in order to enable the construction sector to meet human settlement development goals, while avoiding harmful side-effects on human health and on the biosphere, and, second, to enhance the employment-generation capacity of the construction sector*".

A quick audit of the "sustainability" status of the contemporary construction sector reveals significant shortcomings in terms of the above objectives. In his book *Rough Guide to Sustainability* (2002) Brian Edwards states that construction consumes:

- Materials – 50% of all resources globally;
- Energy – 45% of energy generated to heat, light and ventilate buildings and 5% to construct them;
- Water – 40% of water globally for sanitation and other uses in buildings;
- Land – 60% or prime agricultural land lost to farming; and
- Timber – 70% of global timber products.

In classical economic theory, this consumption should lead to equivalent benefits (the Benefits-to-Resources-Used Ratio): again, an audit of "benefits" might well reveal that many immovable assets provide an economic yield of some order but often fail to deliver social and environmental benefits.

The Benefits-to-Resources-Used Ratio (BRU-ratio) assumes a critical significance in the light of the renewed focus on infrastructure delivery as a mechanism to promote economic growth an alleviate poverty. The World Bank, among others, has confirmed that it will increase its funding for infrastructure, a major departure from funding policy in the past. This new policy is premised on the recognition of the centrality of infrastructure in the links between income growth and human development. Due to these links, poor people in developing countries need access to basic services like energy, water, telecommunications and roads. It is clear that infrastructure spurs growth, which in turn can spur greater infrastructure.

The provision of infrastructure services to the poor looms larger than ever before, especially now as the international community concentrates its efforts on the achievement of the Millennium Development Goals. In many ways, infrastructure investments underpin virtually all the MDGs including halving poverty in the world by 2015. In the World Bank's study *Voices of the Poor*, where the Bank went to 60 countries and interviewed 60,000 people about what they wanted, key services, like roads, water, sewage, electricity, and health care, were at the top of their list.

The need – and the challenge – is to identify those interventions that will fundamentally alter the BRU-ratio and create an enabling environment for construction to add-value to society and to the environment through the infrastructure delivery process. The CAAs *Architect's Guide to Designing for Sustainability*, by developing and sharing a triple bottom line-based framework, aims to offer architects throughout the Commonwealth policies and technology choices that will meet human settlement development goals, resolve the conflict between human resource demands and natural resource capacity, and contribute to meaningful job creation in the construction sector.

Central to the constructing of such an enabling framework is the incorporation of the triple bottom line – economic prosperity, social well-being, and environmental stewardship. In addition, the framework must be responsive to other international conventions, specifically the adoption of the *CSD Theme Indicator Framework* of the United Nations Division for Sustainable Development.

4 Adding economic value

The construction sector can add economic value to infrastructure formation by adopting the following policies:

Support economic growth – This can be done by firstly, maximising the employment of SMMEs on the project throughout the projects life cycle through their integration into the supply chain and through partnering, and secondly by restricting service costs as a percentage of the income generated by the facility.

Change consumption and production patterns – This requires reducing material consumption, minimising energy use throughout the life cycle, restricting waste generation and increasing waste recycling through a focused waste management plan, restricting the extent of transport required for materials, labour and users, and achieving efficiency of facility use.

5 Adding social value

The construction sector can add social value to infrastructure formation by adopting the following policies:

Respect local cultural heritage – This requires the conservation of cultural resources and respecting local customs and traditions, both social and physical.

Engage the local community – This seeks to integrate the facility into the community by involving the community in the decision-making, delivery, use and maintenance process.

Provide education and training – This aims to use the delivery process as an education and training opportunity by facilitating the transfer of technology, contributing to human resource development, and providing ABET.

Ensure equity – This seeks to contribute to the alleviation of poverty by employing previously unemployed persons, creating new jobs throughout the delivery chain (supply, construction, and maintenance), using local labour, maximising employment opportunities for women, providing

separate amenities on site (sanitary, health-and child care), ensuring the safety of workers, respecting labour rights, and providing decent on-site amenities.

Strengthen healthcare – This aims to offer preventative healthcare, ensure that the facility has a healthy indoor environment, ensure that an acceptable and sustainable standard of sanitation is available, provide access to a hygienic and sustainable water supply, improve security during construction and in-use by aligning the delivery process with community security programmes, adopting crime reducing strategies (mutual surveillance), and taking all necessary safety precautions, including the necessary disaster management plans.

6 Adding environmental value

The construction sector can add social value to infrastructure formation by adopting the following policies:

Protect the atmosphere – This seeks to contribute toward minimising climate change and the destruction of the ozone layer, and improving air quality.

Enhance biodiversity – This recognises the centrality of biodiversity in human ecology by supporting the local ecosystem, strengthening selected indigenous species, and re-establishing biodiversity connectivity.

Protect fresh water and groundwater – This aims to restrict the consumption of water, promote rainwater harvesting, increasing the recycling and re-use of water, and improving the quality of watersheds and aquifers.

Conserve land – This recognises the increasing loss of land for agricultural purposes and is aimed at increasing the rehabilitation of brownfields, minimising development on greenfields, protecting and increasing the number of trees, using soft landscaping to increase CO^2 absorption, creating heat sinks and minimising maintenance by using indigenous species, restricting hard landscaping to minimise water run-off, heat islands and light reflection, reducing chemical and light pollution, and taking steps to implement erosion control.

7 Sustainable Infrastructure Development Framework

Against the background as sketched above, and having developed an understanding of the principles of sustainable development, one can identify specific criteria for a Sustainable Infrastructure Development Framework (SIDF) for the construction sector.

The SIDF for the construction sector will have to be firmly constructed on the key elements of sustainable development, namely economic, social and environmental sustainability. Adhering to this requirement is of particular importance to many participants in the construction sector as many investors, donors, listed constructors, material manufacturers and suppliers are under obligation, as affected enterprises, to adhere to the requirements of triple bottom line reporting. Professional service suppliers, on the other hand, are under obligation, as trusted advisors, to assist their clients and the communities they serve to comply with the provisions of good corporate governance.

Having regard for the above, the following defining characteristics, as indicated in tables below, constructs a Framework for all construction sector participants.

Table 1: SIDF for the Construction Sector: Economic Prosperity

Theme	Sub-Theme	Indicator
Economics	SMMEs	% employed
	Ongoing costs	Service cost as a % of income
Consumption and production	Material consumption	Intensity of use
		Durability
		Ease of deconstruction
		Environmental impact

		Toxicity
		Levels of v.o.cs
		Recycling
		Storage
		Maintenance
	Energy consumption	% of energy consumed from non-renewable energy
		% of energy consumed from renewable source
		Intensity of use
		Embodied energy
	Waste generation	Volume of construction waste generated
		Volume of solid waste generated
		Volume of waste recycled
	Transportation	Distance travelled, materials
		Distance travelled, labour
		Distance travelled, users
	Efficiency of use	% useable space
		% occupied
		% downtime
		Buildability

Table 2: SIDF for the Construction Sector, Social Well-being

Theme	Sub-Theme	Indicator
Cultural heritage	Resources	Conservation of cultural resources
	Local traditions	Respect for local custom
Community	Empowerment	Community involvement
Education	Adult	HR Development
		Transfer of technology
		ABET
Equity	Poverty	% previously unemployed
		Jobs created
		% local labour
	Gender equity	% women employed
		Separate amenities
	Employment practices	Safety
		Labour rights
		Amenities
Health	Preventative healthcare	HIV/AIDS awareness

		On-site health care
	Indoor environment	Noise abatement
		Daylighting
		Access to views
		Ventilation and thermal comfort
		Waste removal
		Inclusitivity
		User control
		Smoking
	Sanitation	Standard
		Treatment
		Disposal
	Drinking water	Access
		Reliability of service
		Hygiene
	Crime	Community programmes
		On site measures
	Safety	Precautions
		Disaster management

Table 3: SIDF for the Construction Sector: Environmental Stewardship

Theme	Sub-Theme	Indicator
Atmosphere	Climate change	Greenhouse gases emitted
		Susceptibility to sea-level rise
	Ozone	Emissions of depleting substances
	Air quality	Pollutants during construction
		Pollutants in use
Biodiversity	Ecosystem	Selected ecosystems
	Species	Selected species
		Indigenous species
		Connectivity
Fresh water and groundwater	Water quantity	Intensity of use
		% rainwater harvested
		% recycled and reused
	Water quality	Watersheds protected
		Aquifers protected
Land	Trees	% retained
		% added
	Soft landscaping	CO^2 absorption
		Heat sinks created
		Ease of maintenance
	Hard landscaping	Heat island creation
		Light reflected
	Brownfield development	% rehabilitated
		Density of use
	Greenfield development	% open land retained
		Density of use
	Pollution	Leeching of chemicals
		Light
	Storm water	Erosion control

8 Conclusion

The social and environmental components of various governmental, donor and construction sector participants are not current strengths of many of these stakeholders. Far more can and should be gained by using infrastructure as a socially and environmentally supportive opportunity. Further research that addresses which constraints need to be reformed and what related potentials are to be derived from infrastructure investment offers significant opportunities.

There is currently very little auditing of projects to ensure compliance with environmental and social guidelines as indicated above. As a consequence, many of the benefits to be derived from the resources used in infrastructure formation are not being realised, to the ultimate detriment of its beneficiaries. The development of this discipline presents a huge opportunity for professionals to contribute not only towards sustainable development but maximising the benefits derived from the resources consumed.

Infrastructure development must become results focused and a SIDF such as the one provided above can contribute toward the determination of results. This is possibly the 'missing middle' between infrastructure developments on the one hand, and economic growth and poverty alleviation on the other.

Due diligence and good corporate governance is gaining widespread recognition with more and more corporations committing to good corporate governance imperatives as well as extensive Corporate Social Investment (CSI) programmes. Increasingly investment decisions are being guided by the certainty of due diligence and the execution of good governance in countries and corporations. The linkage between good corporate governance and duel diligence on the one hand, and the BRU Ratio on the other hand, must now be made.

The construction sector, including the built environment professionals sub-sector, will have to climb "up the curve" on its understanding of governance issues, including environmental and social imperatives, with regard to the infrastructure formation as a whole. A major intervention is required in learning, understanding and implementing of such a strategy.

It is our view that the CAA's strategic position in developing countries offers enormous opportunities to make available the knowledge developed through its research agenda.

At the same time, the learning to be gained from its member's Commonwealth experience can prove highly beneficial to developing the global competitiveness and performance standards of the construction sector within the Commonwealth.

Attracting international investment requires the creation of an enabling environment: the successful and sustainable delivery of infrastructure too requires the creation of an enabling environment, albeit of a different nature. These matters should engage our minds as built environment professionals and therefore the sharing of knowledge within the Commonwealth can but only stand us in good stead later.