APPROPRIATE CONSTRUCTION TECHNOLOGIES AND STANDARDS - A KEY TO SUSTAINABLE DEVELOPMENT IN AFRICA

A keynote address for the African Engineers Forum on the theme of Sustainable Development in Africa Zimbabwe, 26 June 2001

Ron Watermeyer *PrEng CEng FSAICE FIStructE*

Vice President (Technical Leadership) of the South African Institution of Civil Engineering
Vice President elect of the Institution of Structural Engineers

INTRODUCTION

Sustainable Development in the context of developing countries may be considered to be a self-initiated and self-sustained development process based on the needs and resources of the community with minimal reliance on external resources. Sustainable Development in its truest sense is accordingly a developmental process initiated by the people themselves. Sustainable community development should be based on the following convictions (Watermeyer, 1995)

- the process of 'development' should be self-sustaining in the long run;
- the very process of 'development' must be initiated by the 'people' themselves;
- the roles of 'outsiders' must be time-bound and their scope of assistance limited to the provision of alternatives and, if necessary, towards the provision of 'seed capital', including human capital; and
- the dependence on 'outside' resources must be as far as possible minimised

THE AFRICAN RENNAISANCE AND THE CONSTRUCTION INDUSTRY

The African Renaissance is about African unity and solidarity; development and renewal and an end to the marginalisation of the continent in world affairs. Accordingly its success is dependent upon Africans defining its aims and objectives and taking responsibility for its success or failure (Makgoba, 1999).

The African Renaissance as such embraces the concepts associated with sustainable development associated in developing countries.

The construction industry, which may be regarded as a broad conglomeration of industries and sectors which add value in the creation and maintenance of fixed assets within the built environment, has a vital role to play in a country's economy viz (Gounden, 2000):

- The production of specific, national, basic needs
- The provision of most of a country's fixed capital assets and infrastructure, thereby playing a pivotal role in national development and generating the necessary infrastructure to enable other industrial sectors to develop
- A direct contribution to the country's Gross Domestic Product, thereby stimulating further growth through its linkages with other industrial sectors.
- The creation of jobs

The development of a strong and healthy African construction industry forms an integral part of the African Renaissance.

Africa was the cradle of evolution from the earliest dawning of human development. Today, the pyramids of Egypt remain as the oldest evidence of human determination to mould its environment. These pyramids represent a proud moment in the history of Africa's indigenous construction industry alongside the churches in Ethiopia and the Zimbabwe ruins. There is a need with the call for the rebirth of the African continent to look to the past as well as the future.

Africans must recognise the long forgotten technology required to build the pyaramids and have faith in their ability to build the future. The call for Africa's renewal is a call to everyone in the construction industry to commit themselves to the cause of the African Renaissance.

The Millennium Africa Renaissance Programme which was announced at the World Economic Forum meeting on 28 January 2001 (or the Millennium Partnership for the African Recovery Programme (MAP) as it is now referred to) and spear headed by President Thabo Mbeki (South Africa), President Olusegun Obasanjo (Nigeria), and President Abdelaziz Bouteflika (Algeria), declares the intent of African leaders to take ownership and responsibility for the sustainable economic development of the continent. Two of the six priorities which were originally outlined in the programme of concrete action, relate to increasing investment in the information and communication technology sector and to the development of infrastructure. (Draft 3a of MAP states that MAP *is a pledge by African leaders based on a common vision, and a firm and shared conviction that they have a pressing duty to eradicate poverty and to place their countries, both individually and collectively, on a path of sustainable growth and development, and to participate actively in the world economy and body politic. It is anchored on the determination of Africans to extricate themselves and the continent from the malaise of underdevelopment and exclusion in a globalising world*.)

The indigenous African construction industry has a vital part to play in addressing some of the MAP priorities and making a contribution to the socio-ecomonic aspects of this programme.

THE CONSTRUCTION INDUSTRY WITHIN THE AFRICAN CONTINENT

Imperialism and colonism has left most African countries with, *inter alia*, low domestic savings and a reliance on foreign investment. In the absence of an environment, which attracts foreign investment and promotes the development of a domestic investment, many countries have become reliant on foreign donor funds for up to 50% of their national budget. Many African countries at the same time are forced to secure loans from organisations that have been structured to make loans available to countries that have difficulty in raising money in commercial markets. These organisations normally finance projects that involve large procurement contracts with transnational construction firms, large consulting firms and procurement contractors. In this manner, the money spent through these organisations is channeled back to the countries that established these organisations through increased exports and more jobs for their citizens. As a result, the indigenous construction industry in these countries have not benefited from the projects and continue to remain under developed and marginalised.

The South African construction industry is very different from the construction industries within the Southern African region. This is as a result of the size of South Africa's Gross Domestic Product which is three times the size of any other African nation's economy. South Africa's construction industry currently has skewed ownership patterns arising from the system of apartheid and is grappling to develop and integrate a fledgling black construction industry into the mainstream of the construction industry. The industry, through a rigorous programme of procurement reform, has, however, made major strides in addressing these imbalances and has seen the emergence of a viable black construction sector in the last few years. The South Africa construction industry is accordingly not divorced from the problems facing construction industries in other African countries.

The more developed construction industries in African nations such as that within South Africa should not be seen as a threat to the sustainable development of less developed countries, but rather as an opportunity to accelerate the development of such industries. The more developed African countries have the capacity to research and develop appropriate solutions to African problems and to lead the way in the development of the indigenous construction industry. Less developed construction industries need to capitalise on this and distil from these solutions what is appropriate to their country and embrace these solutions in order to realise their own industry development goals.

CONSTRUCTION INDUSTRY DEVELOPMENT ISSUES IDENTIFIED IN THE SADC REGION

The Southern Africa Construction Initiative (SACII) was initiated in 1993 and co-ordinated by the Ministry of Works and Construction of the Kingdom of Swaziland on behalf of ten countries in the Southern African region. The objectives of this initiative as set out in the Mbabane regional seminar in May 1993 were to:

- Identify constraints to the development of local Construction Industry in each participating country within the region.
- Identify specific policy reforms to improve the enabling environment for local construction industry, growth and development.
- Implement reforms in these countries with governments and donor commitment to local construction.

A second regional seminar was held in February 1996, which recommended that the Southern African Regional Construction Industry Council (SARCIC) be established. The first SARCIC meeting was held in Lusaka in May 1996. Delegates at this meeting emphasised that SARCIC should uphold the objective for local industry development identified at the Mbabane SACII seminar. It was agreed that SARCIC would retain its independence but develop a strong interface with SADC.

SARCIC at a meeting in Midrand in November 1999 discussed the priorities to develop the local regional construction industry. The outcomes of the meeting was that SARCIC should concentrate on a common framework to develop indigenous / domestic industries and service providers. The identified core components on the common framework included targeted procurement policy and mechanisms, emerging sector development, access to finance, access to training, access to information and standardisation and simplification of contract documents.

A number of issues which could have a significant impact on construction industry development in the region were identified at the SARCIC meeting held in Lusaka in September 2000, attended by representatives from 9 Southern African nations, namely procurement; contract documentation; contractor development programmes; information dissemination and economic indicators. The identified areas for future discussions included:

- The relevance of the South African targeted procurement system to the development of local industries throughout the region.
- The development and standardisation of information dissemination systems for the industry.
- Standardisation of contract documentation, specifications and general conditions of contract
- Information sharing on the effectiveness of the various national and local contractor and consultant development programmes.
- Standardisation of contractor classification programme throughout the region.

Recently, the Department of Public Works, within the context of its role in construction industry development and the South African Government's commitment to African Renaissance, hosted a 3-day regional conference. This conference sought to develop the framework for a regional development agenda. Delegates suggested that the following actions were necessary to take the development process forward:

1 Introduce targeted procurement on all major contracts and promote genuine joint ventures with international companies.

2 Establish a core " Emerging Contractor Development Programme" which consolidates opportunities, addresses entrepreneurial training, finance and credit and access to information.

3 Work towards a regional Register of Construction Enterprises, or sister Registers using the same accreditation criteria and categorisation methods.
4 Work towards regional co-operation agreements between professional institutions to facilitate cross-border professional practice and regional and global competitiveness.
5 Disseminate research outputs, new technologies and best practice, transfer technologies and facilitate the application of technologies and best practices.
6 Transform the procurement practices of donor funding institutions and aid agencies.
7 Enhance the human resource pool through access to information, information sharing and knowledge management.
8 Develop cross border co-operation between governments.
9 Establish a core " Emerging Consultant and Supplier Development Programme" which consolidates opportunities, addresses entrepreneurial training, capacitates, mentors provides finance and credit and access to information for consultants and suppliers.

For sustainable development to take place and MAP to be realised, not only the SADC construction industry, but also the African construction industry needs to be developed.

APPROPRIATE TECHNOLOGIES AND STANDARDS

Engineering may be defined as a creative synthesis, which requires problem solving, in which there are no unique answers, but only compromise solutions. Specifications, codes of practice and standards establish a framework of acceptable and recognised engineering practice within which engineers can arrive at solutions. Engineering practice is accordingly to a large extent shaped by those who draft such documentation.

Africans need to take charge of how infrastructure is conceptualised, programmed and designed, how materials and plant and equipment items are specified, what resources are required to execute engineering and construction works, and who benefits from the upstream and downstream activities associated with the provision of infrastructure.

Procurement lies at the heart of infrastructure development. Donors and foreign consulting and contracting companies are very skilled at developing infrastructure in a manner which best suites their interests. Africans have to counter this through standing together and establishing an enabling procurement regime which promotes the use of local resources and capacity building amongst Africans and utilises technologies and standards appropriate to the African continent. The availability, or lack thereof, of appropriate specifications and suitable technology choices can have a marked influence on the degree to which African objectives can be attained in infrastructure projects (Watermeyer, 1999). If Africans are to succeed in their endeavours to change the status quo both the development of appropriate technologies and standards and the standardisation of procedures and practices is required.

Targeted procurement, a system of procurement developed in South Africa to utilse procurement as an instrument of policy (Watermeyer, 2000), provides employment and business opportunities for marginalised / disadvantaged individuals and communities – referred to as the "Target Groups". It enables social objectives including those relating to construction industry development and poverty alleviation to be linked to procurement in a fair, transparent, equitable, competitive and cost effective manner. Targeted Procurement also permits these social objectives to be quantified, measured, verified and audited. (Refer to www.targetedprocurement.com) This system of procurement allows resources to be structured in contracts to favour African objectives, including those relating to the development of indigenous construction industries.

"Labour- based" is a descriptor used to describe production process and technologies which are designed and managed so as to promote the creation of employment with predetermined socio-economic benefits. Labour-based construction technologies and methods, provided that they are cost effective, are appropriate solutions in developing countries. Developed countries generally

have no interest in such technologies. As a result, it is up to Africans to develop standards to provide a reliable framework within which such technologies and methods can be implemented. Quality may be regarded as conformance to stated requirements (specification) rather than fitness for purpose. It is achieved by executing a contract to stated requirements. Small scale entrepreneurs have particular problems in achieving quality, depending upon how quality is measured and defined. It may be argued that these standards have been drafted to suit the well established industry and are framed around plant-based methods of manufacture and medium to large scale enterprises which have a reasonable degree of technical competency and testing resources. In addition, the test methods and procedures for quality assurance are generally written for a scale of operation where sufficient quantities for statistical purposes are manufactured, and the cost of testing by external authorities (or that associated with the establishment of in house laboratories) can be written off against the volume of the article which is manufactured. Failure by a small scale manufacturer to comply with one of the requirements of these specifications, albeit a relatively minor lack of compliance, means that compliance with a national / international standard cannot be claimed. Thus in effect, many of the current specifications present a barrier to entry to indigenous small scale entrepreneurs and exclude their participation in particular markets. Simple, inexpensive point of manufacture tests are required to address this. (Watermeyer, 1997)

Performance specifications can permit bidders to make technological choices which impact on both cost and socio-economic deliverables, such as the use of local resources, the increase in employment opportunities per unit of expenditure, or the provision of business opportunities to targeted enterprises (Watermeyer, 1999). User needs and performance levels acceptable to the user, however, need to be defined. Africans need to define the levels of user performance acceptable to Africans. If this is not done, non-Africans will impose user performance needs which suite their agendas and marginalise indigenous forms of construction.

At the same time, appropriate information technology needs to be considered. Appropriate standards for professional qualifications also need to be considered. Africans need to determine what is appropriate to serve the needs of Africa in these areas.

AREAS IN WHICH LEARNED SOCIETIES AND PROFESSIONAL ASSOCIATIONS CAN MAKE A CONTRIBUTION

Learned societies and professional associations have a role to play in the African Renaissance and the Millennium Partnership for the African Recovery Programme. Africans need to develop solutions for African countries. They cannot rely on foreigners to address and solve African problems as such persons have their own agendas and often put forward inappropriate solutions. Learned societies and professional associations collectively have the knowledge and expertise to enable engineers to tackle infrastructure development with an African agenda.

Learned societies and professional associations should, in concert with other construction industry players, play a leading role in:

- Establishing appropriate best practice guides, codes of practice, technical manuals and specifications to enable African engineers to arrive at engineering solutions from an African perspective, where this is appropriate.
- Establishing a procurement regime which facilitates the participation of indigenous and / or local contractors, service providers and materials suppliers in the provision of engineering and construction works.
- Establishing performance standards and user performance levels for human settlements which facilitate the use of indigenous technologies and materials.
- Establishing and disseminating best practices in the area of labour-based technologies and methods which maximise the use of local resources in a cost efficient manner.
- Establish common standards (codes of practice, specifications and test methods) for design, procurement, and the accreditation of professionals.

- Establishing point of manufacture tests for the acceptance of construction materials.
- Establishing ways in which information can be shared and disseminated, technologies can be transferred and the implementation of best practices and technologies can be facilitated.

African engineers also need to identify together with other industry stakeholders, how they can best serve the aspirations for the development of indigenous construction industries of Africa and to thereafter gear their institutions and professional associations to deliver in these areas.

Based on the identified needs of the construction industry within the SADC region, it is suggested that learned societies and professional associations can make substantive contributions or assume the lead role in the following areas:

- Dissemination of information pertinent to construction industry development.
- Standardisation and simplification of contract documentation, specifications and general conditions of contract
- Information sharing on the effectiveness of the various national and local contractor and consultant development programmes.
- Implementation of the targeted procurement methodology
- Cross-border professional practice and regional and global competitiveness.
- Transformation of the procurement practices of donor funding institutions and aid agencies.
- Capacity building

CONCLUSION

African engineers should work together with each other to locate the environment within which they practice in an African context and in so doing realise the African Renaissance and make a substantial contribution to the Millennium Partnership for the African Recovery Programme.

REFERENCES

Department of Public Works. Developing the Construction Industries of Southern Africa: Working Towards a Common Development Agenda. Farm Inn, Pretoria, 23-25 April 2001.

Gounden SM. The Impact of the National Department of Public Works' Affirmative Procurement Policy on the Participation and Growth of Affirmable Business Enterprises in the South African Construction Sector. Phd Thesis, University of Natal, 2000.

Makgoba, MW.(Ed). African Renaissance. Mafube Publishing, Cape Town, 1999.

Watermeyer RB. Community-based Construction: A route to sustainable development and job creation. JSA Inst Civ Eng Vol 36, No. 1, First quarter, 1995.

Watermeyer R.B. 1997. Mobilising the Private Sector to Engage in Labour-Based Infrastructure works; A South African Perspective. Sixth Regional Seminar for Labour-based Practitioners. Ministry of Works, Transport and Communications in collaboration with ILO/ASIST, Jinja, Uganda, October.

Watermeyer, RB. Socio-economic Responsibilities: the Challenge facing Structural Engineers. The Structural Engineer. September 1999.

Watermeyer, R.B. The use of Targeted Procurement as an Instrument of Poverty Alleviation and Job Creation in Infrastructure Projects. Public Procurement Law Review, Number 5, pages 226 to 250; NA105-NA123, Sweet and Maxwell, 2000.