REPORT


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The Zambia Green Jobs Programme is a United Nations System initiative comprising the Food and Agriculture Programme, the United Nations Environmental Programme (UNEP), the International Trade Center (ITC), the United Nations Conference for Trade and Development (UNCTAD) and the International Labour Organization (ILO).
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1. Introduction

The Government of the Republic Zambia (GRZ) recognizes the challenge that it faces in facilitating more broad-based wealth and the creation of jobs and decent work. The Sixth National Development Plan (SNDP, 2011) aims to accelerate poverty reduction, enhance human development, increase investment in rural areas, as well as creating decent and productive employment. Employment creation is also referenced in the United Nations Development Assistance Framework for Zambia (2011–2015) which draws its strategic direction from the SNDP. Of particular relevance is Outcome 2 of the SNDP: ‘Targeted populations in rural and urban areas [are to] attain sustainable livelihoods by 2015’ and more specifically the Country Programme Outcome 2.2 on ‘Government and Partners [are to] provide targeted beneficiaries with opportunities for gainful and decent employment by 2015’.

GRZ has identified private sector development as the best strategic means with which to boost employment, and is placing particular policy emphasis on the development of Micro, Small, and Medium Scale enterprises (MSMEs). This policy focus is illustrated in the MSME policy and implementation plan (2010–2015) launched in January 2011. The policy recognizes the MSMEs sector as one of the most prolific sources of employment and wealth creation. It acknowledges that the development of MSMEs is one of the most sustainable ways of reducing poverty levels and of improving the quality of life of its citizens. The main policy focus areas include entrepreneurship development, innovation and technology, access to finance, business development services, business premises, access to markets, and representation of MSME’s interests.

GRZ seeks to make private sector development actionable through a number of initiatives and is, together with its development partners, implementing an overarching private sector development reform programme (PSDRP II) which aims to improve the overall business environment in Zambia. In addition, the Zambian government has supported other MSME focused interventions such as the Broad Based Wealth and Job Creation programme, implemented with technical support from ILO, UNDP, UNCTAD, and UN Global Compact, and funding from the Finnish Government. The programme sought to create jobs and enhance incomes among citizens through MSME development such as the Jobs for Prosperity and Competitiveness project implemented by the World Bank. Other initiatives include those by USAID which focus on the development of small-scale farmers in selected value chains.

However, very few of these ongoing private sector development initiatives have had an explicit focus on the green economy, and in particular on the creation of green jobs in MSMEs here defined as jobs that make a direct contribution to the preservation or restoration of environmental quality. Specifically, but not exclusively, this includes jobs that help protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high-efficiency strategies; decarbonize the economy and minimize or altogether avoid the generation of all forms of waste and pollution. This blind spot described above translates into a missed opportunity, since the employment creation potential of the green economy is significant. For example in South Africa, the employment creation potential of the green economy has been assessed to be as high as 300,000 jobs. For Zambia, a systematic assessment of the green job creation potential is still outstanding but estimated to be in the region of several ten thousand jobs.

1.1 Rationale

A sector with high potential for green jobs creation in Zambia is building construction. The building and construction sector has been identified in the National Construction Industry Policy of GRZ as one of the main enablers of economic growth. According to the National Council for Construction of Zambia, the sector has registered rapid growth of more than 17 per cent annually in recent years, and is poised to expand further on the back of public sector funded infrastructure development projects and a strong demand for residential housing, and in the office and retail markets. According to the Central Statistical Office, the building and construction sector employs a considerable labour force, with a reported annual average of 9,756 employees in the formal sector, and 15,000 in the informal sector, during the period from 1995 to 2008 (and a large share of these are semi-skilled workers.) In both the formal and informal sector, industry employees average about 25,000, and although the sector was hit by the impact of the global economic and financial crisis in 2008–09 it has since recovered and resumed its growth path. The Zambian

1 Definition derived from the UNEP–ILO 2009 report on green jobs.
The Sixth National Development Plan (SNDP, 2011) aims to accelerate poverty reduction, enhance human development, increase investment in rural areas, as well as creating decent and productive employment.

Building industry in particular offers excellent potential for green job creation due to its high labour intensity, low entry barriers for semi-skilled and unskilled labour, and the high concentration of MSMEs. The building and housing industry is also an excellent conduit for facilitating the reduction of greenhouse gases in the built environment through the promotion of eco-friendly and locally produced building materials and the installation of renewable energy technologies in buildings. In acknowledgement of this link, the Ministry of Lands, Natural Resources and Environmental Protection has placed emphasis on the sustainable utilization of natural resources, including raw building materials inputs like timber, timber products, and other building inputs.

1.2 Study Objectives

The objective of the study in this Report was to assess the capacity and business needs of MSMEs in the building construction industry, and their relation to MSMEs’ abilities to participate in the green building goods and services and technologies market, and to identify any possible interventions which could boost the sustainability of MSMEs in the building construction industry.

This needs and capacity assessment study would make a direct contribution to achievement of Outcome 3 of the Green Jobs Programme, namely that MSMEs have enhanced capacity to effectively participate in the building construction and green building goods and services market.

1.3 Target Audience

The primary target audience of the needs assessment study comprises:

a. governmental and non-governmental organizations with a mandate to facilitate the development of the building industry in Zambia, with thematic emphasis on green economy transition, MSME development and employment creation, and with a strategic focus on setting and enforcing an industry-specific policy, legal and regulatory framework;

b. providers of industry-specific financial and non-financial business support services, with the focus target group being MSMEs with expertise in green building practices;

c. participating UN Agencies in the joint programme; and

d. national and international research centres, universities, and consortia operating along the value chain and wishing to learn and transfer best practices to the Zambian business environment and eventually accelerate the creation of partnerships between local MSMEs and international companies.

1.4 Scope of Work

The consultant was expected to review the green jobs programme document and existing documentation related to green building and the capacity development of MSMEs in building construction. The consultant was further expected to conduct a gap analysis in order to determine knowledge and skill deficiencies and the related capacity needs of MSMEs in the building construction industry, which in turn could limit their ability to effectively participate in the market. The gap analysis was to include assessments of:

e. levels of building construction knowledge and skills among MSMEs and their workers (both technical and business knowledge, including green building skills); and

f. capacity and performance levels relating to existing infrastructure, equipment, and appropriate technologies relevant to green building practices.

In the process of conducting the task, the consultant was expected to interview selected stakeholders, including MSMEs along the building construction value chains, selected BDS providers, business associations, and other relevant stakeholder organizations, in order to establish MSMEs business development needs and to gather information that would guide the design of programme support interventions. Based on the analysis of study findings, the consultant was expected to make recommendations on the kind of intervention strategies needed to address the identified MSMEs knowledge and skill limitations, and any existing capacity gaps.
2. The Study’s Methodology

The study’s methodology was expected to include, but not be restricted to, the following:

- Qualitative in-depth interviews with open-ended questions designed to stimulate discussion with a wide range of stakeholders with first-hand knowledge about green building initiatives and contexts.

- Expert Panels: peer reviews, or reference groups composed of experts to extract information on green building knowledge, skills, and practices among MSMEs. These experts could provide a wider understanding of the capacities and limitations of MSMEs in the building construction industry and provide important sources of information.

- Snap survey of MSMEs using pre-coded and self-administered questionnaires to extract information of the knowledge and skills levels of MSMEs relating to building construction and green building practices and any existing gaps or deficiencies. Entries were then recorded on electronic support media and analysed using SPSS computer software on the basis of standard descriptive, inferential, and econometric techniques.

2.1 Desk study

A literature review on green building construction was undertaken, with a specific focus on the inherent capacities of MSMEs in Zambia to effectively and sustainably implement projects that embrace green building technology. Issues addressed in the literature included:

- elaboration on the technical aspects of green building construction;
- potential impacts that the green building technological approach can bring to bear on the existing labour market;
- the applicability of the value chain development approach in green building construction;
- assessment criteria for materials used in green building construction;
- the linkages that exist between the environment, the economy and the labour market;
- sustainable building construction in Africa; and
- the skills needs for green building construction.
The review positively augmented the design process and content formulation of the semi-structured questionnaires.

2.2 Semi-Structured Interviews

The interviews were conducted using open-ended questions that also enabled or stimulated much deeper elaboration on the issues under discussion. The questionnaires contained four main focus areas namely training, consultancy, and developers and financiers. The specific areas of focus during the interviews included:

- the applicability and acceptability of green building construction in Zambia among potential developers;
- determination on the existing knowledge and skill levels in green building construction and maintenance practice amongst MSMEs;
- what kind of training (if any) is currently provided to MSMEs in green building construction and what issues could be incorporated in a future green building training programme for MSMEs and other key stakeholders;
- determination of the capacity needs required for MSMEs (in terms of equipment and appropriate technologies) to effectively participate in green building construction projects and the green building goods and services market;
- options on how to pilot green building technology in Zambia most effectively and sustainably.

The participants were drawn from the following organizations:

- Ministry of Transport, Works, Supply and Communications (Buildings Department)
- Ministry of Education, Science, Vocational Training and Early Education (School Infrastructure Section)
- National Council for Construction (NCC)
- Lusaka City Council (Engineering Services Department)
- The Business Development Service Providers Association of Zambia (BDSPAZ)

The interviews that were conducted in this phase are to be considered preliminary, as more identified stakeholders are yet to be engaged in the final phase.

A literature review on green building construction was undertaken, with a specific focus on the inherent capacities of MSMEs in Zambia to effectively and sustainably implement projects that embrace green building technology.
3. Literature review

There is a plethora of literature available on green buildings (ILO, 2007; ILO, 2010; Tudora, 2011; UNEP, 2008; ILO, 2011; and ONEWORLD, 2010). Among those acknowledged here, as well as many others, the ILO makes a significant contribution by identifying key occupations in the green building value chain and defines green building as activities that contribute to:

- reducing the energy and water needs of domestic buildings and non-domestic buildings;
- reducing the environmental impact of sourcing and manufacture of materials and components from which buildings are constructed and the negative impacts of construction processes, including demolition and its potential for reusing and recycling materials and components; and
- improving health and comfort of the occupants once the building is completed.

The important contribution that the ILO’s reports make to the green building debate is in identifying the core occupations in each part of the green building value chain, and describing the main skills required for each. Most of the identified occupations already exist, but require new skills and knowledge; a small number are new, such as energy auditors.

New functions that are related to existing occupations, such as installing wall insulation or solar water heating, take different approaches in different countries: in some cases, the functions are undertaken by existing occupations; in others, jobs are split between different occupations; while in other cases new specialist occupations with specialist training are emerging, such as solar panel installers; finally, these function are also being taken on by a workforce from a range of backgrounds through additional training.

In many contexts, the availability of skills forms a constraint on what can be achieved in green building construction. Without sufficient high-quality and professional skills in green building among architects and engineers, the energy performance of new buildings intended to be green may be compromised, while designs that achieve high standards of energy efficiency may be prohibitively expensive to build.

Without the necessary high-quality skills in green building among skilled construction workers, high prices, and uneven quality may slow the progress of retrofitting initiatives. Finally, inadequate skills among policy-makers may render schemes intended to promote green building ineffective.
3.1 Occupations in Conceiving, Planning, Designing, and Advising

The main types of occupation included under this occupational group are (ILO, 2011):

- construction company managers and business functions;
- architects and civil/structural/environmental engineers;
- architectural technicians/technical drawing specialists;
- building services, HVAC, electrical, mechanical, sanitary, and renewable energy engineers/designers;
- surveyors; and
- energy and water efficiency and waste management analysts/consultants/advisers.

3.2 Occupations in Construction, Installation, and Maintenance

Once a green building project is approved for construction, people with the appropriate skills are required to implement it. Green building brings new technologies and techniques to construction which change the required skills, although most roles can still be filled by skilled construction workers from existing occupations with only a limited amount of additional training.

3.2.1 Building Site supervisors/Site Engineers, and Architects

Building site supervisors/site engineers and architects are responsible for the management of a building site, where the project is big enough to justify their employment. Because they have an intimate knowledge of project specifications and are the ones who are present on site, they provide the main bridge between plan and execution. They supervise construction workers and the quality of their work, control the flow of products and materials, and communicate with the architects and/or engineers responsible for the project.

The building site or construction supervisor should be capable of overseeing workers in undertaking green building works such as in the installation of insulation, installing grey-water systems, installing efficient heating and air conditioning systems, installing renewable energy systems and the management and recycling of waste materials.

3.2.2 Insulation and weatherproofing

Insulation and weatherproofing is an important area of activity in retrofitting of existing buildings for energy efficiency. Examples of trades involved in insulation include masons, bricklayers, and plasterers. Some of the insulation-related occupations include (ILO 2007):

- Bricklayers;
- Roofers;
- Glaziers;
- Insulation installers, dry wall installers, and plasterers;
- Woodworkers;
- Painters and decorators; and
- Electricians, plumbers, and installers/maintainers of heating and HVAC systems may also be required to move fixtures.

3.2.3 Plumbers and heating installers/maintainers

The broad area of ‘green plumbing’ encompasses the occupations of plumbers and heating installers/maintainers. It focuses on installing proficient heating systems, making existing heating systems more efficient, using water more proficiently and installing solar water heating systems. This can be extended to cover rainwater harvesting; the use of grey water (any household wastewater with the exception of toilet water); the installation of heat pumps using geothermal or inertial ground temperature; and biomass heating systems.

Ecological or green sanitation comprises well-controlled sanitation systems with multiple objectives: reducing water use, improving health and environmental quality, and promoting nutrient recycling. It is based on four building blocks: source-separation, containment, sanitization and recycling. Urine and faeces can be separately collected and stored to make the most out of nutrient recycling.

These sanitation systems are of two main types: dehydration (chemical) or decomposition (biological). Faeces containing a high organic content will decompose and can be used as fertilizer to improve soil quality. Urine, which is rich in nitrogen, phosphorus, and potassium, can be a valuable plant fertilizer.
3.2.4 HVAC installers

HVAC (heating, ventilation and air conditioning) installers need backgrounds in electrics, plumbing, and in the installation of ducting vents. Specialized knowledge includes an understanding of temperature and humidity, and the ability to make relevant measurements. The installer should be able to perform load calculations, measure airflow, and do full commissioning and maintenance work following installation. These occupations install the whole HVAC system, which owing to technology differences may require a different skills’ set from the ones of heating systems installers.

3.2.5 Electricians and IT technicians

Electricians have important roles in green building, having the main responsibility for installing a range of new technologies and being involved in installing the supplies of electric power and control systems required for others. There are many innovations that can be applied through specification and the installation of new electrical technologies, ranging from the choice of light bulbs to motion-sensor light switching, as well as other electricity-saving devices such as smart meters.

Electricians may also be required to install the electrical parts of plumbing systems (electric water heating, heat pumps, small-scale CHP (combined heat and power systems), including controls. In the case of larger buildings, controls can be complex and require specialist IT technicians to install them. There is evidence of a new occupation in the installation and maintenance of photovoltaic systems emerging in several countries, which undertakes both the structural work and electrical work associated with installation.

The term ‘green electrician’ has not achieved currency similar to that of ‘green plumber’ but has been applied to electricians involved in installing solar photovoltaic systems.

3.2.6 Installers/maintainers of solar thermal systems

The installer/maintainer of solar thermal systems is responsible for the installation and maintenance of solar thermal systems for hot water production, mainly in buildings and swimming pools. Demand for these occupations is higher in countries where weather conditions are good enough, and latitudes are low enough, to make the technology a reasonably reliable source of heat.

The installer of solar thermal technologies is responsible for placing the structure of the panels in the right place and at the correct angle to maximize solar gain throughout the year. This implies a basic understanding of mathematics and physics to make the necessary calculations.

Once the structure is fixed to the exterior of the building, these workers make the necessary connections with the interior plumbing system, basic plumbing skills are therefore essential. In some cases, they also have to install circuits and electrical equipment including controls for solar heating, which requires electrical knowledge. Alternatively, electricians with an understanding of solar thermal systems can do this part of the installation.

Installers may also be responsible of the maintenance of the system, but in some cases, optimizing solar thermal systems to maximize efficiency requires additional training. The importance of preventive maintenance is also important; with the aim being to reduce potential problems that may appear while using the technology. The client should be instructed on efficient and safe use of the system, and good communication skills are thus necessary. Counselling and marketing skills are also very relevant for this occupation as these workers should be able to advise the client on the best solution, and in some cases sell relevant products.

3.2.7 Installers/maintainers of wood pellet and other biomass heating systems

Skills for installers/maintainers of wood pellet and other biomass heating systems are centred on traditional plumbing skills, supplemented by knowledge of the characteristics of biofuels, the ability to calculate heat loads, and an understanding of relevant legislation and regulations. For example, it is very important for them to understand and determine moisture content, calorific value, bulk density and the energy potential of biofuels. It is also important to have knowledge of locally available fuel supplies, including types of fuel, suppliers, and pricing.
4. Key findings

4.1 The Green Building Value Chain: The Zambian Perspective

The Zambian perspective of the green building value chain is unique, and it was established that there are certain approaches that are relatively new, for example stabilized soil block construction, which will create demand for awareness and training; whilst other aspects need reintroduction, such as a requirement for the seasoning of timber for construction use. In addition, solar installations for lighting and water heating have not been widely implemented in Zambia, while in countries such as Kenya and Botswana their use is widespread on both public- and privately-funded infrastructure projects. These factors underscore the need to develop a value chain unique to Zambia as shown in Figure 1.

4.2 Skills in Timber

Usage of timber for construction of housing infrastructure in Zambia is primarily influenced by availability and cost. Currently, demand far outstrips supply, which in turn has adversely impacted the overall quality of construction timber available at any time. This shortfall in Zambia has been exacerbated by the upsurge in construction activities in the last decade. It is envisaged that this trend will continue for the next 15 years, after which the newly planted plantations will have mature timber available for sale. It follows therefore that timber merchants throughout the country predominantly have for sale fresh, raw, untreated timber which has not been subjected to any form of preservation or seasoning. For example, construction timber for roof trusses should not have a moisture content that exceeds 12 per cent; however, this standard is neither adhered to nor demanded by

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There is an on-going programme by ZAFFICO where an average of 3500 hectares of timber is being planted annually to replenish stocks.
consultants who prepare the drawings and specifications for building projects. The key identified observations with respect to skills’ deficiencies in timber usage are:

i. For MSMEs that are producers and/or merchants of raw sawn timber;
   - the utilization of substandard sawmilling equipment which results in very high wastage or poor recovery rates, which ideally should be at least 50 per cent but currently stands at 30 per cent;
   - a lack of technical know-how and appreciation of seasoning of timber and its crucial importance;
   - a lack of technical know-how and appreciation on timber preservation techniques using the appropriate and effective wood preservatives.

ii. For MSMEs who are building contractors;
   - a lack of know-how on the benefits and advantages of using well-seasoned timber;
   - a lack of technical know-how on the rationale behind preservation timber and the correct usage of preservatives;
   - there is limited capacity and knowledge on the fabrication of various timber based building components such as roof trusses and wall panels. The new trend in truss manufacture requires the usage of metal-toothed plate connectors for connecting the various members within a truss that when used correctly enhance the overall quality of the truss and reduce the cost due to less wastage;
   - no knowledge on how to install weather insulation in the roof ceiling area.

4.3 Skills in Masonry

A key feature of the green building technological approach is to reduce the environmental impact of both the sourcing and production of necessary construction materials and components together with the potential for reuse and recycling where demolition of an existing
structure is involved. Stabilized soil blocks have been identified for use in the construction of walls in the low and medium cost housing units envisaged by the programme. This building material is relatively new to Zambia, has not been widely used, and hence the general technical know-how among the MSMEs and end users is very low despite its many inherent benefits. The MSMEs will require skills enhancement and awareness in the following aspects of masonry that utilizes stabilized soil blocks:

- MSMEs need capacitation on the whole production process of the blocks, starting with soil selection criteria and consistency, mix ratios between cement, selected soil and water, mixing procedures, general machine operation, compaction, handling and storage, drying, and curing;
- as the artisans are familiar with the construction of walling using hollow or solid concrete blocks or bricks and clay there is the need to upgrade their skills in wall construction, with a particular focus on:
  - corner construction;
  - joint construction;
  - notching of the blocks;
  - coupling of the partition walls to the main load bearing walls;
- the effect that material siting and selection has on the overall cost of construction; and
- the fixing of window frames, door frames, electrical conduits, and electrical fixtures on walls constructed using stabilized soil blocks.

There is also the need to inform MSMEs on the market availability and cost of the moulding machines and on its benefits, such as the savings associated when compared to other commonly used alternatives.

4.4 Skills in Solar Technology

This solar technological approach for water heating and lighting has not been extensively used in Zambia largely because of low energy costs over the years, and the surplus availability of energy; the ready availability of technical skills and know-how to effectively undertake these tasks is thus insignificant. There is however an abundance of skilled artisans who can install the commonly used water heating and lighting systems that are powered by electrical energy. This is a skill base which can be built upon in order for artisans to work on green building installations with relative ease. The artisans need to be trained on all the aspects and techniques required for the correct and safe installation of solar based lighting and heating equipment. These include general wiring, circuit installation, panel orientation with respect to the sun and roof pitch, general anchorage, and piping and valve installation.

4.5 Design, Specifications and Standards

The MSMEs will need capacitation on how to read and interpret the information on green building projects as these specifications will be relatively new as compared to the existing commonly used ones. There are specifications that have a linkage with the quality and standard of the material being used during construction. Often, the usage of green or unseasoned timber was blamed on a lack of enforcement by the Zambia Bureau of Standards (ZABS).

Cap 416 of the laws of Zambia outlines the functions of ZABS which include:

i. to promote and require the adoption of standards in industry and commerce with a view to improving:
   - the quality of commodities;
   - industrial efficiency and productivity; and
ii. to make arrangements or provide facilities for the examination and testing of:
   - commodities to which standards apply; and
   - the material or substance from which a commodity may be procured, manufactured, processed, treated, or finished;
iii. to act as consultants in the field of standards and provide advisory services to industry, including any service industry
   - to establish laboratories and other facilities for the performance of its functions;
   - to encourage or undertake education in connection with standards.

The introduction and propagation of the green building approach for low and medium-cost housing brings to the fore various business opportunities for those involved directly or indirectly in the process.
As can be inferred from the statute, the role of ZABS is mainly to promulgate standards and ensure that they are available in the various sectors. Furthermore, the standards are classified into two main types.

- **Voluntary**
  which are based on industry best practice and can be enforced if the industry itself demands it.

- **Compulsory**
  which are based on public health, safety, health or environment.

In the case of timber the general consensus was that ZABS should ensure that timber for sale to the public should be well seasoned and have a moisture content that does not exceed 20 per cent at the most. From ZABS's perspective the timber currently falls within the voluntary category and hence they are unable to strictly enforce this standard. The same would also apply to the stabilized soil blocks. Assurance of certain specific standards and specifications is incumbent on the industry players themselves, which in this case are the consultants, contractors, and regulatory agencies (e.g., the local authorities).

### 4.6 Capital and Finance

Financial institutions in Zambia have of late begun to develop and offer specially tailored financial packages for MSMEs in a quest to meet a growing market need. The packages have developed in such a way that several requirements that were regarded as encumbrances have now been simplified. However, there are several basics that the MSMEs ought to adhere to which are actually basic business principles such as being registered with the Patents and Companies Registration Agency (PACRA), operating a bank account, showing from what source the borrowed funds will be repaid, and demonstrating a willingness to repay the borrowed funds.

STANBIC Bank (Z) Ltd, ZANACO Ltd, and Standard Chartered Bank (Z) Ltd are examples of banks that have established dedicated and specialized units to deal with MSMEs. STANBIC Bank does not even require MSMEs to produce a balance sheet or a profit and loss statement, and financing is available up to One Hundred and Twenty Thousand Zambian Kwacha, or approximately USD 20,000. ZANACO, as an act of corporate social responsibility, offers a service which encourages MSMEs to properly manage their account books, which in turn will simplify the assessment process should they apply for business capital.

### 4.7 Gender

The gender issue in the Zambian construction industry mainly refers to the increased involvement and general participation of women, as this industry has primarily been dominated by men. Currently there are very few women with roles in the construction sector, such as company proprietor, site engineer, foreman, charge-hand, artisan (across trades) and general worker. There are however a vast number of women successfully running small to medium sized businesses in other sectors, including construction-related fields such as trading in spare parts, cement, timber, and general hardware. Another factor responsible for this imbalance is that the institutions responsible for training technical trades have not given priority to the enrolment and training of women.

The green building interventions can prove to be a vehicle for increasing women's participation at all stages of the value chain, which will also create desperately needed employment opportunities for them. There is currently a move by women contractors’ to merge all the six women contractor associations into one single association, in the hope it will provide a stronger voice, and lobby for women contractors.

### 4.8 The Business Case for Green Building Technology

The introduction and propagation of the green building approach for low and medium-cost housing brings to the fore various business opportunities for those involved directly or indirectly in the process. There are several differing perspectives from which to view this issue.

#### 4.8.1 Property Developers

Houses constructed using green building technological approaches are bound to be cheaper overall, due to lower labour and material costs, as well as distinct advantages such as reduced energy costs, improved ventilation (which leads to better occupant health and productivity), reduced water consumption through the use of “grey water” for garden and lawn irrigation. These factors create a marketing opportunity for potential estate developers to generate interest and capture potential buyers.
4.8.2 MSMEs in Material Production and Supply

The green building approach presents itself as an opportunity for business development potential; some examples include:

- The waste generated from logging of trees in the plantation (currently 30 per cent waste) and from sawmilling can be captured and used to manufacture chipboard tops and briquettes.
- There is a large market gap for seasoning of timber and general preservation of timber which companies could fill.\(^3\)
- Production of stabilized soil blocks for sale.
- Manufacture of trusses.

4.8.3 MSMEs in Construction

Opportunities for MSMEs in construction include:

- As skills for green building construction are not common, there is a higher probability of winning tenders due to reduced competition when compared to the conventional construction arena.
- The conversion of existing hot water installations in houses, offices, schools, etc., that are currently dependent on electrical energy to solar based technology.
- Modification of the grey water waste disposal systems in dwelling houses to irrigate the lawns and gardens.

\(^3\) This is conditional to the seasoning of timber being made mandatory by design consultants and regulators.
5. Recommendations

The following are the recommendations that have emerged from this study.

5.1 Awareness of Green Building Construction

There must be a deliberate and concerted effort by proponents of green building technology to create and foster increased awareness among the key stakeholders of this approach to infrastructure construction. The stakeholders should include technocrats in the relevant government ministries (who can influence the policy-makers), technocrats in the local authorities, local authority councilors, design consultants, and potential developers drawn from both the public and private sectors. The technical training institutions should also be encouraged to include this building approach in their syllabus so that they can develop a strong cadre of technocrats well versed in green building technology.

5.2 Policy and Legal Issues

The adoption of green building technologies will require paradigm shifts in the existing policy on building standards and there will be the need to add these standards to existing ones. The eventual widespread use of stabilized soil blocks for example will require local authorities to have a clear understanding of their durability and strength. There should also be a clear standpoint on the maximum permissible moisture content in raw timber prior to sale. In Zimbabwe for example timber used for the fabrication of trusses cannot have a moisture-content in excess of 20 per cent. Construction of house walling and floors using timber will also require special consideration, as it is often perceived to be unsafe on account of fire risk.

5.3 Technical Training Needs

The findings indicate that there is a strong need for comprehensive training of stakeholders who would play a key role in the implementation of green construction projects. This need stems from the current lack of
awareness and basic knowledge of the various facets that make up the green building approach. The stakeholders to be trained include:

- selected staff from local consulting companies;
- the technical staff responsible for approving plans and conducting stage inspections of buildings and other infrastructure interventions within a local authority;
- proprietors and/or technical supervisory staff from MSMEs who are building contractors;
- proprietors and supervisors of MSMEs involved in the production of building materials;
- selected staff from regulatory agencies such as the National Water Supply and Sanitation Council (NWASCO) and the Zambia Bureau of Standards (ZABS).

Figure 1, showing the green building value chain, also outlines the players in it that require training and their sequential order. For example, training MSMEs and consultants before training regulatory staff may prove futile since there will be no competent officers to scrutinize and approve the submitted building plans that have incorporated the green building concepts and approaches. A more successful scenario would involve training MSMEs, regulatory staff and consultants before awareness creation for government technocrats whose role is to articulate and advise policy-makers to formally adopt and accept this concept. It is therefore recommended that the training and awareness creation must from the onset target and include government technocrats as a means to assure ownership of the green building approach.

### 5.4 Technical Training Content

For the consulting staff and local authority staff the training should focus on the basic philosophy behind green building technology and the various design approaches and layouts. They should also be exposed to some practical examples of facilities constructed using green building technology (or even a full demonstration unit) which will help them to develop the necessary confidence to enable to competently supervise MSMEs.

The MSMEs that are building contractors will require exposure to all the various segments of green building technology when applied to low and medium cost housing, and which include:

- basic “taking off” of quantities and costing;
- tendering;
- selection of raw materials for stabilized soil block manufacture;
- manufacture (production) of the stabilized soil blocks;
- construction using the stabilized soil blocks including specific emphasis on corners, wall joints, wall intersections and block notching;
- effective and economic truss and rafter production;
- installation of solar lighting reticulation;
- installation of solar heating installation;
- installation of rain water harvesting systems.

It is envisaged that the initial cadre of trained MSMEs can also serve as trainers for those MSMEs unable to access the initial training.

The MSMEs that are involved in material production and supply will need training in the following:

- economical logging of timber i.e., wastage should be minimized or recoveries should be high;
- economical sawing (processing) i.e., wastage should be minimized or recoveries should be high;
- seasoning of timber i.e., sun dried and kiln dried processes;
- preservation of timber and correct usage and handling of preservatives;
- production of stabilized soil blocks i.e., material identification, mixing ratios, compaction, curing, and general handling.

The regulatory authority staff need to understand this approach and its technical aspects if they are to be able to regulate the MSMEs effectively. The recommended training outline should include:

For the staff from NWASCO:

- installation of rain water harvesting systems;
- usage of low water consuming fixtures, e.g. taps and cisterns.
For the staff from ZABS:

i. quality aspects and requirements of the soil stabilized blocks with respect to general appearance and compressive strength;

ii. seasoning of timber and moisture content levels;

iii. preservation of timber;

iv. solar lighting materials;

v. solar heating materials.

5.5 Training in Business and Financial Management Skills

The findings revealed a severe deficiency in general business and financial management skills among MSMEs, which in turn adversely impacts their ability to grow and compete effectively. Training would be required in the following areas:

i. basic letter writing;

ii. record keeping;

iii. statutory compliance issues;

iv. time keeping and wage calculation;

v. basic book keeping and banking;

vi. store keeping;

vii. purchasing.

5.6 Equipment and Tools

Inadequate and poor-quality tools and equipment were also cited as being the cause of poor workmanship and high wastage levels, both of which are contrary to the standards of green building technology. For example, during the logging of timber there is high wastage due to the usage of poor quality chainsaws. Lack of equipment can even result in the production of poor quality stabilized soil blocks. Indubitably there is a need for MSMEs to have good quality equipment and tools; however a lack of funds has been identified to be the main impediment to MSMEs acquiring high-quality, appropriate equipment and tools (A recommendation is given in Section 5.8 on financing and capital).

5.7 Standards

The lack of standards was cited as the main reason for usage of poor quality timber (unseasoned and untreated). ZABS can only develop standards for the industry if their demand is driven by the construction industry. It is therefore recommended that the proponents of green building technologies approach ZABS to initiate the process for the development and eventual setting of standards for timber and stabilized soil blocks.

5.8 Regulation and Enforcement

The regulatory agencies, as already recommended, shall need to garner a full understanding of the green building approach if they are to effectively execute their functions. Prudent regulation was singled out as one of the most effective drivers for improvements in the quality of materials, general workmanship, and adherence to the prescribed standards.

5.9 Financing and Capital

Lack of adequate financing has been cited as one of the impediments to adopting green building practices by MSMEs; however, financing is available so long as basic conditions are adhered to. The conditions that the banks have set out are based on adherence to good business practices by MSMEs. It is therefore recommended that MSMEs should, as far as is as practically possible, undergo training in good business practice, as recommended in the section on “Training in business and financial management skills” which will enhance their chances of accessing capital.

5.10 The Role of Women

The involvement of women in the Zambian construction sector has to date been very insignificant, as this sector has been largely regarded as the domain of men only.

There must be a deliberate and concerted effort by proponents of green building technology to create and foster increased awareness among the key stakeholders of this approach to infrastructure construction.
This inequality needs to be reversed, as women can participate in this sector very effectively. Botswana and South Africa are two examples of countries in the region where women actively participate as proprietors, engineers, technicians, site supervisors, artisans, as well as unskilled labour. Furthermore, the construction sector can generate many employment opportunities for women, opportunities that enhance household security and contribute towards poverty alleviation. The following are recommendations which can facilitate women’s participation in green jobs construction:

i. a guaranteed quota of women participants in all green building training activities;

ii. female-owned construction companies to be given a slight advantage during the adjudication of bids;

iii. higher institutions of learning that offer construction-related training skills should encourage the enrollment of women through an “affirmative action programme”;

iv. the existing women’s contractor associations should be merged into one association which will enable it to have a stronger lobby and voice;

v. more “pro women” policies to be formulated and adopted until there is a level playing field.
References


—. 2010b. Green jobs, green skills, available at: http://www.ghkint.com/LinkClick.aspx?fileticket=mZcC9TMK%2Ft8%3D&tabid=211


—. 2011c. Towards a Greener Economy: the Social Dimensions

—. 2011d. Comparative analysis and methods of identification of Green Skills Need


### ANNEX I: List and profile of persons met

<table>
<thead>
<tr>
<th>Name</th>
<th>Qualification</th>
<th>Profession</th>
<th>Organization</th>
<th>Position</th>
<th>Years with Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr M. S. Mashamba</td>
<td>PhD, Mphil (Arch), BArch</td>
<td>Architect</td>
<td>National Council for Construction</td>
<td>Executive Director</td>
<td>13</td>
</tr>
<tr>
<td>Mangelele I.</td>
<td>B Eng, M Eng,</td>
<td>Civil and Environmental Engineer</td>
<td>Ministry of Education, Infrastructure Section</td>
<td>Engineer</td>
<td>15</td>
</tr>
<tr>
<td>Sendama G.</td>
<td>B Arch.</td>
<td>Architect</td>
<td>Lusaka City Council (Previously Ndola City Council and Mufulira Municipal Council)</td>
<td>Director of Engineering Services</td>
<td>16</td>
</tr>
<tr>
<td>Phiri G.</td>
<td>M Arch.</td>
<td>Architect</td>
<td>Ministry of Works (Buildings Dept.)</td>
<td>Ag Chief Architect</td>
<td>19</td>
</tr>
<tr>
<td>Daka B.</td>
<td>Dip (Carp), Dip (Ed Tech)</td>
<td>Carpentry Instructor</td>
<td>Thornpark Construction Training Centre</td>
<td>Head of Construction</td>
<td>25</td>
</tr>
<tr>
<td>Mukwavi G.</td>
<td>BA (Ed)</td>
<td>Educational specialist</td>
<td>Business Development Service Providers Association</td>
<td>Consultant</td>
<td>5</td>
</tr>
<tr>
<td>Banda S.</td>
<td>Several courses in Zambia and abroad since 1967</td>
<td>Forester (also former Principal at the Forestry College, Kitwe)</td>
<td>Private Consultant</td>
<td>Retired Deputy Director of Forestry</td>
<td>38</td>
</tr>
<tr>
<td>Mwape F.</td>
<td>B Eng</td>
<td>Engineer</td>
<td>National Construction Council</td>
<td>Principal</td>
<td>22</td>
</tr>
<tr>
<td>Simumba D.</td>
<td>Cert Highway Engineering</td>
<td>Technician</td>
<td>DANSUZ Investment Ltd</td>
<td>Proprietor</td>
<td>17</td>
</tr>
<tr>
<td>Simumba D.</td>
<td>Cert Highway Engineering</td>
<td>Technician</td>
<td>National Association for Medium and Small Scale Contractors</td>
<td>National Secretary</td>
<td>-</td>
</tr>
<tr>
<td>Chendauka B.</td>
<td>MSc</td>
<td>Forester</td>
<td>Ministry of Tourism and Natural Resources</td>
<td>National Project Coordinator and Principal Forester</td>
<td>25</td>
</tr>
<tr>
<td>Mulongwe L.</td>
<td>MSc</td>
<td>Forester</td>
<td>Ministry of Tourism and Natural Resources</td>
<td>Principal Forester</td>
<td>22</td>
</tr>
<tr>
<td>Banda F.</td>
<td>B Eng</td>
<td>Engineer</td>
<td>Technological Development Advisory Unit</td>
<td>Project Engineer</td>
<td>3</td>
</tr>
<tr>
<td>Banda A.</td>
<td>B Eng</td>
<td>Engineer</td>
<td>Technological Development Advisory Unit</td>
<td>Project Engineer</td>
<td>3</td>
</tr>
<tr>
<td>Lewanika C.</td>
<td>MA</td>
<td>Planner</td>
<td>Kusini Construction</td>
<td>Proprietor</td>
<td>4</td>
</tr>
<tr>
<td>Mulenga M Dr.</td>
<td>PhD</td>
<td>Engineer</td>
<td>UNZA</td>
<td>Senior Lecturer</td>
<td>28</td>
</tr>
<tr>
<td>Sichinga J.</td>
<td>MSc</td>
<td>Forester</td>
<td>Copperbelt Forestry Company</td>
<td>Managing Director</td>
<td>30 (years experience)</td>
</tr>
<tr>
<td>Mutale M.</td>
<td>B Sc, FCCA</td>
<td>Chemist</td>
<td>Zambia Bureau of Standards</td>
<td>Director</td>
<td>20</td>
</tr>
<tr>
<td>Chipasha S.</td>
<td>BA</td>
<td>Banker</td>
<td>Zanaco Bank</td>
<td>Manager</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Name</td>
<td>Degree</td>
<td>Profession</td>
<td>Organization</td>
<td>Position</td>
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<tr>
<td>20</td>
<td>Karabassis A.</td>
<td>BSc</td>
<td>Quantity Surveyor</td>
<td>Costbuild Ltd.</td>
<td>Proprietor</td>
</tr>
<tr>
<td>21</td>
<td>Mutale J.</td>
<td>MA</td>
<td>Banker</td>
<td>Stanbic Bank</td>
<td>Head Personal Banking</td>
</tr>
<tr>
<td>22</td>
<td>Mulwila D.</td>
<td>LLB</td>
<td>Lawyer</td>
<td>Bimmtech Ltd</td>
<td>Proprietor</td>
</tr>
<tr>
<td>23</td>
<td>Mulwila D.</td>
<td>LLB</td>
<td>Lawyer</td>
<td>Zambia Association of Women in Construction</td>
<td>Interim President</td>
</tr>
</tbody>
</table>
ANNEX II: Questionnaire for Training Providers

Green Building Construction is a SUSTAINABLE building approach that encourages and encompasses good environmental management and efficient resource utilization. For maximum impact, the approach ought to extend across the entire life cycle of a building, that is from conception, budgeting, design, siting, construction, operation, and maintenance (including renovation and demolition). Green Buildings should encompass and enhance the following features:

- Energy utilization efficiency
- Water utilization efficiency
- Material resources efficiency
- Protection of occupant health through good indoor environmental quality enhancement strategies
- Reduction of pollution
- Reduction of wastes and toxic substances
- Use of natural materials which are locally available
- Use of renewable resources

Profile of Informant

Name: ..............................................................................................
Profession: ..................................................................................
Qualification: .............................................................................
Occupation: ................................................................................
Organization: ...........................................................................

1) Does your institution provide training in Green Building construction? If not, can you make any suggestions on how such training can be effectively administered?

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2) Which areas of Green Building Construction in your opinion would be the most suitable for piloting this approach in Zambia?

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3) Are MSMEs capable of successfully implementing green building housing projects? Please elaborate giving reasons for their current skill levels and limitations.

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4) What aspects do you believe should be incorporated in a training programme to upgrade the skills of MSMEs with respect to Green Building Construction?

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5) Which other stakeholders apart from MSMEs in your opinion should receive capacity building in Green Building Construction?

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6) Any other comments?

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ANNEX III: Questionnaire for Construction Consultants

Green Building Construction is a SUSTAINABLE building approach that encourages and encompasses good environmental management and efficient resource utilization. For maximum impact, the approach ought to extend across the entire life cycle of a building, that is from conception, budgeting, design, siting, construction, operation, and maintenance (including renovation and demolition). Green Buildings should encompass and enhance the following features:

- Energy utilization efficiency
- Water utilization efficiency, including rainwater harvesting and waste water recycling
- Construction material resources efficiency, including the use of locally available materials
- Protection of occupant health through indoor environmental quality enhancement strategies
- Reduction of pollution through the recycling of construction materials
- Reduction of waste and toxic substances
- Use of natural materials which are locally available, such as stabilized soil blocks, thatched roofs, timber, etc.
- Use of renewable resources such as solar energy, biogas, etc.

Profile of Informant

Name: ..............................................................................................
Profession: .......................................................................................
Qualification: ...................................................................................
Occupation: ....................................................................................
Organization: ..................................................................................

1) As a construction consultant, do you believe that there is a market in Zambia for Green Buildings in the housing sector?

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2) What are your views on the applicability and acceptability of Green Buildings in the housing sector, as opposed to traditional houses, by both public and private developers? (Please give reasons)

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3) Is there capacity among MSMEs in Zambia to successfully implement Green Building housing projects? Outline (giving reasons) the shortcomings/deficiencies (if any) and suggest interventions that may be required to redress observed weaknesses.

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4) What capacity building initiatives are required to upgrade the skills base in Green (Sustainable) Housing projects amongst MSMEs in Zambia?

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5) As a construction consultant, what other views do you have about the future of Green (Sustainable) Housing and the capabilities of MSMEs on this development agenda in view of the climate change dilemma?

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ANNEX IV: Questionnaire for Developers

Green Building Construction is a SUSTAINABLE building approach that encourages and encompasses good environmental management and efficient resource utilization. For maximum impact, the approach ought to extend across the entire life cycle of a building, that is from conception, budgeting, design, siting, construction, operation, and maintenance (including renovation and demolition). Green Buildings should encompass and enhance the following features:

- Energy utilization efficiency
- Water utilization efficiency, including rainwater harvesting and waste water recycling
- Construction material resources efficiency, including the use of locally available materials
- Protection of occupant health through indoor environmental quality enhancement strategies
- Reduction of pollution through the recycling of construction materials
- Reduction of waste and toxic substances
- Use of natural materials which are locally available, such as stabilized soil blocks, thatched roofs, timber, etc.
- Use of renewable resources such as solar energy, biogas, etc.

Profile of Informant

Name: ..............................................................................................................................
Profession: ...................................................................................................................
Qualification: ..............................................................................................................
Occupation: ............................................................................................................... 
Organization: ........................................................................................................... 

1) As a developer, do you believe that there is a market in Zambia for Green Buildings in the housing sector?

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2) What are your views on the applicability and acceptability of Green Buildings in the housing sector, as opposed to traditional houses by both public and private developers? (Please give reasons)

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3) Is there capacity among MSMEs in Zambia to successfully implement Green Building housing projects? Outline (giving reasons) the shortcomings/deficiencies (if any) and suggest interventions that may be required to redress observed weaknesses

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4) What capacity building initiatives, in your view, are required to upgrade the skills base in Green (Sustainable) Housing of MSMEs in Zambia?

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5) As a developer, what other views do you have about the future of Green (Sustainable) Housing and the capabilities of MSMEs on this development agenda in view of the climate change dilemma?

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ANNEX V: Questionnaire for Financiers

Green Building Construction is a SUSTAINABLE building approach that encourages and encompasses good environmental management and efficient resource utilization. For maximum impact, the approach ought to extend across the entire life cycle of a building, that is from conception, budgeting, design, siting, construction, operation, and maintenance (including renovation and demolition). Green Buildings should encompass and enhance the following features:

- Energy utilization efficiency
- Water utilization efficiency
- Material resources efficiency
- Protection of occupant health through good indoor environmental quality enhancement strategies
- Reduction of pollution
- Reduction of wastes and toxic substances
- Use of natural materials which are locally available
- Use of renewable resources

Profile of Informant

Name: ..............................................................................................
Profession: ..........................................................................................
Qualification: ..........................................................................................
Occupation: ..........................................................................................
Organization: ..........................................................................................

1) What are the overarching policies regarding financial support to MSMEs within your Institutions?

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2) How does your Institution perceive giving financial support to MSMEs in the Construction sector? If not (or if it is very minimal) what aspects inhibit providing this support?

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3) Please elaborate on requirements meant to avert risk; e.g., collateral, performance bonds, all risks insurance, etc.?

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4) Does your institution have any deliberate policies to support proponents of environmentally friendly technological approaches, such as the Green Building Technological approach? If so, for what purpose or items should the support be provided and can you outline the accompanying preconditions?

5) How does your institution perceive the overall capacities of MSMEs, and in your opinion what actions should they take to improve?

6) What aspects should be incorporated in a training programme intended to upgrade the business management skills of MSMEs with respect to accessing financial support for Green Building Construction related activities?

7) Any other comments?
Zambia Green Jobs Programme Office
International Labour Organization
Lubwa Road, Plot 4635
Lusaka, Zambia
Tel: +260 (211) 256 895
E-mail: lusaka@ilo.org

www.zambiagreenjobs.org