

Construction Health and Safety in Developing Countries

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Disclaimer

The authors have sought to report things 'as they are', rather than how they would like them to be, so that project management teams can be realistic about the necessary preparation for work in such countries. Words and images used should not be taken as tacit approval of practices or behaviour observed or reported. It is essential that the industry does not trivialise global construction issues, but takes them seriously in order to drive the change that is needed.

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Foreword

Developing countries accept the presence of foreign companies carrying out work within their borders for a number of reasons:

- as an inevitable consequence of globalisation, as the host country seeks to improve its socio-economic standing
- because their own companies do not have the resources to carry out the work
- to achieve technology transfer from the foreign companies to their own
- or they may be there as a condition of accepting aid money from an industrialised country

Whatever the drivers, the result is that many large projects are carried out in developing countries by companies from industrialised nations.

Some outstanding feats of engineering have been accomplished under these circumstances and are even more commendable considering the major physical and cultural environmental challenges that would have been present.

A number of issues emerge when encountering these challenges, which can lead to a lack of resources being available (eg. equipment to carry out the work, skilled workers and adequate road network for delivery of materials and workers to the site). It is inevitable that any work carried out that is under-resourced will put pressure on the effective management of health and safety.

This manual has been developed to assist those responsible for the management of health and safety. It is not the intention to explain what is different between countries that are industrially developed and those that are developing because this has been thoroughly researched elsewhere. The manual explains those physical characteristics of developing countries (infrastructure, security, politics and weather) along with the human elements (language, literacy, skills and local practices) that impact upon the construction process and the management of health and safety. The manual should also be of use to project management teams working in developed countries, but employing labour from other countries.

The European Construction Institute has supported the research by Loughborough University, funded by the Innovative Manufacturing and Construction Research Centre, that has provided the information for the development of this manual and is committed to the continued improvement of health and safety in construction in all countries around the world.

Graham Hunt

President BP Chemicals China (*retired*)

Vice Chairman SECCO (*retired*)

Non-Executive Director Lucite International

SECTION 1.0

INTRODUCTION

This section explains why a different approach to the management of health and safety is required in developing countries, how this manual will help and gives definitions of developing countries

1.0 Introduction

WHY YOU NEED TO MANAGE DIFFERENTLY

The successful management of health and safety on engineering and construction projects in developed countries is reliant upon certain aspects of the infrastructure, skill levels of workers and standards of equipment being in place.

In industrialised countries, it is taken for granted that

- workers can be transported safely to site in reliable vehicles, on well constructed roads, under tried and tested traffic regulations
- health services are available to attend to workers' overall health and deal with injuries to workers sustained at work or at home
- local food production is sufficient for any size of project
- workers have received a good level of education and are likely to have worked on a project similar to that planned and have received some form of health and safety training on a previous project
- both mechanical construction equipment and personal protective equipment are readily available, manufactured to the standards required for the project and suited to the work and the workers

The absence of these in developing countries can have a negative effect on the management of health and safety.

- workers may get injured travelling to site
- in the event of an accident, emergency vehicles may be delayed on poor roads
- if workers' education and literacy levels are low, transfer of health and safety information will be more difficult, and
- demanding the same amount of work from lower skilled workers is likely to lead to accidents

Responses to the questionnaire survey, section 5, suggested that the use of equipment in developing countries was not satisfactory. If you add this to the unavailability of correct mechanical and personal protective equipment it will almost certainly increase the amount of unsafe work activities.

As well as the above, consideration has to be taken regarding extreme weather conditions, political instability and cultural differences. It is clear that a different approach is required.

HOW THIS MANUAL WILL HELP

This manual has been written following a one year research project at Loughborough University investigating the implications on health and safety of carrying out engineering and construction projects in developing countries.

From the research, a number of issues arose which were of concern to professionals working in these countries. These issues are expanded on in *Main Issues*, section 2, illustrated with examples from various countries and supported by suggested courses of action.

A recommended management process has been drawn up together with *Assessment Tools*, section 4, to assist with understanding the consequences on health and safety of carrying out projects in developing countries.

The research also uncovered various related texts, scientific papers and websites which have been listed in *Further Information*, section 6.

1.1 Definitions

DEVELOPING COUNTRY

A developing country is a country with low average income compared to the world average. The term has tended to edge out earlier ones, including the Cold War-defined "Third World country".

The "developing" part of "developing country" may be considered euphemistic or perhaps optimistic, as many of the poorest countries are hardly developing at all; some have even experienced prolonged periods of negative economic growth. A developed country usually has an economic system based on continuous, self-sustaining economic growth.

Development entails developing a modern infrastructure (both physical and institutional), and a move away from low value added sectors such as agriculture and natural resource extraction.

MEASURE OF DEVELOPMENT

The term "developing country" often refers mainly to countries with low levels of economic development, but this usually is closely associated with social development, in terms of education, healthcare, life expectancy, etc.

The development of a country is measured with statistical indexes such as income per capita (GDP), rate of illiteracy, and access to water. The UN has a compound indicator using these lists of statistics, to create, a "human development index" which gives a sense of how developed countries are.

Developing countries are in general countries that have not achieved a significant degree of industrialisation relative to their populations and which have a low standard of living. There is a strong correlation between low income and high population growth, both within and between countries.

CATEGORIES OF DEVELOPMENT

1. Developed countries (Canada, United States, European Union members, Japan, Israel, Australia, etc)
2. Countries with an economy consistently and fairly strongly developing over a longer period (China, India, Brazil, South Africa, Costa Rica, Mexico, Egypt, much of South America, etc)
3. Countries with a patchy record of development (most countries in Africa, Central America, and the Caribbean excepting Jamaica (category 2), much of the Arab world falls in this category)
4. Countries with long-term civil war or large-scale breakdown of rule of law or non-development - oriented dictatorship ("failed states") (eg Somalia, Sudan, Burma, perhaps North Korea)

WORLD BANK

The World Bank Group is a group of five international organizations responsible for providing finance to countries for purposes of development and poverty reduction, and for encouraging and safeguarding international investment. The group and its affiliates are headquartered in Washington, D.C.

Above definitions from Wikipedia 2005

1.1 Definitions

WORLD BANK LISTS OF DEVELOPING COUNTRIES

East Asia and Pacific (developing only: 24)

American Samoa	Malaysia	Philippines
Cambodia	Marshall Islands	Samoa
China	Micronesia, Fed. Sts	Solomon Islands
Fiji	Mongolia	Thailand
Indonesia	Myanmar	Timor-Leste
Kiribati	Northern Mariana Islands	Tonga
Korea, Dem. Rep.	Palau	Vanuatu
Lao PDR	Papua New Guinea	Vietnam

Europe and Central Asia (developing only: 27)

Albania	Hungary	Serbia and Montenegro
Armenia	Kazakhstan	Slovak Republic
Azerbaijan	Kyrgyz Republic	Tajikistan
Belarus	Latvia	Turkey
Bosnia and Herzegovina	Lithuania	Turkmenistan
Bulgaria	Macedonia, FYR	Ukraine
Croatia	Moldova	Uzbekistan
Czech Republic	Poland	
Estonia	Romania	
Georgia	Russian Federation	

Latin America and the Caribbean (developing only: 32)

Antigua and Barbuda	Dominican Republic	Panama
Argentina	Ecuador	Paraguay
Barbados	El Salvador	Peru
Belize	Grenada	St. Kitts and Nevis
Bolivia	Guatemala	St. Lucia
Brazil	Guyana	St. Vincent and the Grenadines
Chile	Haiti	Suriname
Colombia	Honduras	Trinidad and Tobago
Costa Rica	Jamaica	Uruguay
Cuba	Mexico	Venezuela, RB
Dominica	Nicaragua	

1.1 Definitions

WORLD BANK LISTS OF DEVELOPING COUNTRIES

Middle East and North Africa (developing only: 14)

Algeria	Jordan	Syrian Arab Republic
Djibouti	Lebanon	Tunisia
Egypt, Arab Rep.	Libya	West Bank and Gaza
Iran, Islamic Rep.	Morocco	Yemen, Rep.
Iraq	Oman	

South Asia (8)

Afghanistan	India	Pakistan
Bangladesh	Maldives	Sri Lanka
Bhutan	Nepal	

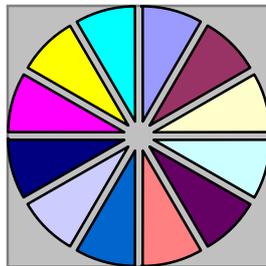
Sub-Saharan Africa (48)

Angola	Gabon	Niger
Benin	Gambia, The	Nigeria
Botswana	Ghana	Rwanda
Burkina Faso	Guinea	Sao Tome and Principe
Burundi	Guinea-Bissau	Senegal
Cameroon	Kenya	Seychelles
Cape Verde	Lesotho	Sierra Leone
Central African Republic	Liberia	Somalia
Chad	Madagascar	South Africa
Comoros	Malawi	Sudan
Congo, Dem. Rep.	Mali	Swaziland
Congo, Rep	Mauritania	Tanzania
Cote d'Ivoire	Mauritius	Togo
Equatorial Guinea	Mayotte	Uganda
Eritrea	Mozambique	Zambia
Ethiopia	Namibia	Zimbabwe

SECTION 2.0

MAIN ISSUES

This section gives details of twelve main issues that affect the management of health and safety due to the physical and cultural environments encountered when working in developing countries



■ Infrastructure	■ Language
■ Literacy	■ Local Practices
■ Politics	■ PPE
■ Security	■ Use of Equipment
■ Vocational Skills	■ Weather Extremes
■ Workers	■ Workers' Families

2.1 Infrastructure

It is very difficult to carry out construction in any country without being affected by infrastructure in the form of roads, hospitals and housing. The support provided by the infrastructure in European countries may not be available in many developing countries and this will impact on the health and well being of workers on any project



Traffic 'free for all', India

Examples¹

Botswana - The provision of housing that is fully serviced and affordable remains a major challenge for most developing countries. A lot of settlements still comprise poor housing structures that are prone to damage during inclement weather, with poor or no utilities, few community facilities and poor roads (Situmbeko & Kanyemba 2000).

Russia - State healthcare is free of charge and covers every citizen. Limited private medical offices and commercial insurance medical plans have been instituted and these services are afforded by only a small number of ex-Soviets. In the case of illness, the hospital sick-leave certificate allows an employee to be out of work for as long as the certificate is issued, but not more than 3.5 months (Khazanet 2002).

Bangladesh - Construction in Bangladesh experiences a relatively poor safety and health record due, in part, to the lack of adequate infrastructure such as roads, bridges, harbours, and power generation facilities (Koehn et al 2000).

Sub Saharan Africa - About a third of the roads built in sub-Saharan Africa over the past 20 years or so are now out of use for want of upkeep. This situation, in which investment efforts fail to produce sustainable infrastructure, can be accounted for by the fact that, in many sub-Saharan countries, the construction industry has not evolved sufficiently over the past four decades or so, to respond to the emerging needs of local economies (Zawdie & Langford 2000).

Tanzania - The construction industry has recorded steady growth from 8.7% in 2001, to 11% during 2002 and 15% in 2003. This growth is attributed to continued Government investment in infrastructure. Also, the economic reforms carried out during the past decade have attracted a significant increase in donor, private sector and foreign direct investment in infrastructure developments (Muhegi & Malongo 2004).

¹ These are examples taken from published literature and may not be representative of the country as a whole, nor are infrastructure issues unique to these countries. Citing these examples does not constitute approval of the practices by the authors or publisher.

HOUSING

The housing that is available to workers can be of a very low quality in some developing countries. If this is likely to increase the risks to the health of the workforce, consideration should be made for the provision of labour camps. These may be necessary anyway if a large enough percentage of the workforce has to be recruited from a considerable distance from the site. Once established, the labour camp needs to be managed effectively to ensure that it meets adequate standards for health, safety and welfare of the workers.



Road Construction, Vietnam

HOSPITALS

It is essential to locate and assess the suitability of local hospitals capable of providing the various levels of treatment likely to be required for workers suffering from work-related injury or ill health. If an adequate level of medical provision is not available within easy reach of the site then provision may have to be made on site (for a reasonable amount of medical treatment) and some alternative transport, helicopter to airlift personnel to more distant facilities if required.

FOOD PRODUCTION

The availability of food for the workforce can vary considerably in developing countries. A project may be situated in an agricultural area with its workforce providing for itself from the land, but frequently there may be no adequate food production for hundreds of miles and food will need to be shipped in.

ROADS

The road network in a country with a developing infrastructure may not provide the necessary support to a project to allow the smooth flow of workers, materials and equipment to and from the site. A poor road network will increase the risk of injury to workers in transit and hinder the rapid transit of injured workers to receive treatment in hospital. With poor road networks, overcrowding of unsafe vehicles and suspect driving practices, it may be difficult to ensure that the workers are able to travel to work in a safe manner.

PROCUREMENT

Decisions made during the procurement process significantly impact upon the success of construction projects. Failure to consider local cultural issues such as the lack of training opportunities, problematic infrastructure, local conflicts and attitudes to time can cause projects to fail. The procurement process needs to consider how to transform technologies to meet local conditions, expectations and needs (Peckitt et al 2004).

What you should do

- Determine safe transport of workers to site
 - Secure provision of food for workers
 - Assess available medical care and how quickly people can be transported for emergency medical treatment
 - Provide housing for workers if required
-

2.2 Language

The inability to immediately communicate via the spoken word on construction sites represents one of the major barriers to successful management of health and safety. When multinational consortia work alongside workforces derived from many countries, the opportunity for the message to be lost in translation is increased



Health and Safety Poster, Hong Kong

Examples¹

Kuwait – Kuwait, as a rich developing country, attracts many investments and working labour. The employment of migrant labour has always been a special characteristic of construction sites in Kuwait. Different labour cultures and traditions reflect on human relations, different work habits, and communication problems (Kartam et al 2000).

China - Miscommunication across cultural lines is usually the most important cause of cross-cultural problems in multinational projects. Miscommunication can have several sources. The same gesture can have different meanings in different parts of the world. For example the Chinese count from one to ten on one hand, and eight is displayed by extending the thumb and the finger next to it. The same gesture is interpreted as meaning two in France and as pointing a gun in North America (Laroche 1998).

USA - The ever-growing number of deaths occurring with Hispanic individuals in the workplace is related to communication. The four most common causes of death in US construction - falls, struck by, caught in / between, and electrical - affect Hispanic workers who do not understand the hazards around them due to limited bilingual training (Flory 2001).

Nigeria - The multi-lingual nature of Nigeria has compelled craftsmen to be able to communicate well enough in English, the country's lingua-franca, if they must have meaningful interactions within their work environment. This is even more essential in multi-national construction firms where many of the professionals they interact with do not speak any of the local languages (Fagbenle et al 2004).

¹ These are examples taken from published literature and may not be representative of the country as a whole, nor are language issues unique to these countries. Citing these examples does not constitute approval of the practices by the authors or publisher.

TRANSLATION

Some developing countries may have an historical link with a European country and therefore the speaking of that European language could be widespread. With global communication and the effects of Hollywood, the US dollar and the British Empire legacy, English is frequently spoken as a second language. In other instances, especially where multi-national consortia are involved, translation of health and safety messages is required. Whilst translation of layman's terms may be within the grasp of most interpreters, it is important that the personnel employed are able to understand technical terms associated with the workings of the project.



Health and Safety Banner, Nigeria

VISUAL MESSAGES

An increasingly popular method of conveying health and safety messages to a wide multilingual audience is by visual means. Traditionally, training material in health and safety has been enhanced by the use of cartoons in manuals and graphic videos showing accidents to help get the message across to usually unresponsive groups of workers. Digital technology facilitates the capturing of site-related images, quickly transferring these into posters or other media to communicate the message in a very relevant way.

ETHNOLOGUE

There is a charitable organisation that has developed a comprehensive study of the world's languages – Ethnologue. This is available on their website and can provide an insight into the diversity of languages that are likely to be encountered when working in different countries. Details of the Ethnologue web site can be found in the reference section.

TRUST

When negotiating with local contractors in sometimes heated circumstances, it is essential that the argument is being delivered accurately. Trust has to be developed with the translator so that meanings are not lost in translation.

What you should do

- Employ multilingual health and safety staff
 - Understand which countries workers will be drawn from and what languages are likely to be spoken on site
 - Adopt tried and tested visual methods to convey health and safety messages
-

2.3 Literacy

How a country develops is partially measured by its rate of literacy. The management of health and safety depends largely on the transfer of information to workers through training programs and printed materials (posters and handbooks). High incidences of illiteracy in construction workers represent a barrier to this transfer in all countries



Safety Poster Nanjing, China

Examples¹

USA - Research into increased workplace accidents and workers with English as a second language states that it is necessary to get these workers involved in all stages of the design, development, and delivery of training to ensure the materials are sensitive to issues of literacy and culture (Kalaro 2004).

South Africa - In a survey of 200 construction workers in South Africa, workers reflected a desire to improve their language skills. However, the delivery of literacy training, while maintaining output, poses problems. The working conditions in the construction industry, for example, long working hours, physical location of sites, physical demands on employees and generally poor facilities are not conducive to training of this nature (English, 2000).

Kenya - The transfer of technology without consideration of technological adaptation has created new and unexpected problems connected with low income and illiteracy as well as with inadequate living conditions, housing and health services. These factors should be taken into account when considering the causes of accidents (Takala 1982).

India - Most women who enter the construction sector do so due to circumstantial poverty or by chance, not by choice. Despite the generally high literacy level in Kerala, 53.3 percent of the respondents were illiterate. The majority of the respondents had worked in the construction sector for up to 5 years and 18.7 percent of the respondents for more than 10 years (Priya 2000).

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Safety Poster, Hong Kong

TRAINING

Workers from developing countries often suffer poor bargaining rights and working conditions because of illiteracy. Their illiteracy will also affect their ability to be trained to carry out construction work in a safe and healthy manner (Koehn et al 2000).

Training programs surpassing the language and literacy abilities of workers has been of concern to health and safety educators in the USA for some time with the proportion of the workforce with English difficulties reported to be between 20 and 30% (Wallerstein 1992).

GENDER

From the illiteracy statistics, it can be seen that women are more likely to have lower levels of literacy than men, so in those countries where it is more common for women to work in construction they are more at risk from not being able to read training information and health and safety signage. These rates are indicated on the country data sheets in section 4 of this document.

EDUCATION

From the early 1970s, Nigeria financed a universal primary education program that has dramatically increased literacy. There are 24 major universities and a host of other institutions of higher learning (Blacknet 2005).

What you should do

- Find out the measured illiteracy levels of the men and women in the country in which you are working
- Keep wording on safety posters to a minimum
- Work with local people to develop the language used in training materials so that it can be easily understood
- Use images to convey the message

2.4 Local Practices

Most construction work is carried out in developing countries using informal and unregulated methods. Therefore workers are usually free to use whatever means are available to them to get the job done. This means lots of workers on site handling materials and equipment manually, not wearing safety clothing and working with traditional methods such as bamboo scaffolding



Erection of Bamboo Scaffolding,
Hong Kong

Examples¹

Chile - When comparing the Chilean construction industry with the construction industries in more developed countries, the Chilean construction sector is more intensive in the use of labour and less in the use of construction machinery and equipment (Serpell et al 2002).

Hong Kong - Bamboo scaffolds are cost and labour efficient, easy to handle, adjust and cut into pieces. They are also more resistant to typhoons, an important factor for many areas. Due to the ease of handling, bamboo scaffolds are erected and dismantled quickly. No machinery, power-driven tools and tightening equipment are required except for hands, simple hand tools and nylon or wire ties (Hong Kong Polytechnic 2005).

China - China's construction enterprises are still labour-intensive and have low labour productivity. According to the China Statistical Yearbook 2003, there were 47,500 construction enterprises, which employed 21.29 million workers, which means an average of nearly 450 employees per enterprise. This is far greater than that of construction enterprises from developed countries (Stewart and Jiang 2004).

Kenya and Tanzania - If all construction activity carried out without a building permit and outside of the system of planning control is regarded as 'informal' then there has clearly been a large expansion in informal construction in Kenya and Tanzania in recent years. Quite large projects are now being commissioned in this way, including multi-storey residential blocks, up to 8 storeys high (Wells 2000).

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TRADITION

Workers from developing countries are likely to bring on to site traditional methods of working that are not orthodox construction methods. In many cases, these will need to be identified and adapted or replaced, through training, with more suitable ways of working. However, occasionally they may not represent a hazard to safety and health and should therefore be carefully assessed and controlled.

INFORMAL CONSTRUCTION

A high percentage of construction work in developing countries is carried out by informal methods. That is to say that the work is unregulated. The increase of informal construction has meant a decrease in skill levels of workers and lowering of the quality of workmanship.

LABOUR COSTS

Labour costs can be a fraction of those in developed countries and this often leads to the use of different methods to get work done. A trench that can be excavated in a few hours with a mechanical excavator may be completed in a couple of days by a gang of workers at a much lower cost. Whilst this can have its advantages, an overriding fact is that there will be considerably more people on the site and this will affect their safety and the safety of those they come into contact with. This is likely to change with greater client expectations and increased availability of equipment.



Trolley for Transporting Materials and Equipment, Nanjing, China

EXPERTISE

An understanding of the expertise available is required prior to the commencement of work. If you are setting up a project in an area where there have previously been similar projects, the workforce may have already received relevant training. Alternatively, if the project is completely novel to this location, more time and effort will be required to enable the workers to perform at the level required.

ENFORCEMENT

Workers may have been used to working as they pleased and without enforcement of health and safety regulations. There may also be a societal culture of ignoring the rules. In these cases, a period of adjustment will be necessary during which increased supervision will be required.

What you should do

- Discover how construction work is carried out locally
 - Decide which if any of the local practices are safe to use
 - Find out the extent of 'informal' construction activity in the area to be worked. The greater this activity, the more workers are likely not to be used to regulations
 - If local practices are acceptable use local experts in training
-

2.5 Politics

An understanding of national and local politics is advisable when working in developing countries.

The national government can affect building regulations, employment laws for construction workers and the importing of equipment. Locally, disputes with workers, unreasonable demands of officials and unreliability of designated suppliers may divert resources away from health and safety



Construction Worker, Russia

Examples¹

China – Due to the parallel status of Government organisations, the three ministries or administrations have very limited influence on each other. In fact, these three organs enforce the law separately, with neither good communication nor cooperation. Thus, in spite of the different focuses on construction safety, their administration over construction sites overlaps in many cases. Not only are the contractors confused, but also the limited administrative resources are wasted (Fang et al 2003).

Nigeria - In Nigeria, almost all existing regulations on safety originated from foreign countries. The 1987 Factory Act, which is the most popular safety regulation, was adapted from the 1961 Factory Act of Great Britain. The 1970 Occupational Safety and Health Act which is another safety document of reference in Nigeria has its origin and even application in the United States of America (Idoro 2004).

Bangladesh - Most of the heavy and specialized equipment were imported from Korea. The Government of Bangladesh ensured the timely delivery of the equipment by providing special arrangements to the contractor. This included the relaxation in import procedures and reduction in taxes and duties (Ahmad, 2000).

Botswana - The government is the largest single client of the construction industry, letting over 80% by value, of all jobs. Due to the enormous bargaining power, the government exerts a lot of impact on the industry, for example, the setting of reservation and preferences schemes for citizen owned firms (Ssegawa 2004).

Slovakia - Safety rules on construction sites are not always strictly enforced in Slovakia. Some employers openly say that they have scant regard for the safety of their workers (Barecz 2001).

¹ These are examples taken from published literature and may not be representative of the country as a whole, nor are local practices issues unique to these countries. Citing these examples does not constitute approval of the practices by the authors or publisher.

CORRUPTION

Corruption at national and local levels usually exists while a country is developing. Difficulties may arise when challenging corrupt practices.

ENFORCEMENT

Most countries have some legislation in place to protect the health and safety of construction workers and much of it is based on the principles embodied in International Labour Organisation instruments and codes (ILO 2005).

A country's legislation can vary considerably and whilst it can be based on that of a developed country, even then it is likely to struggle to stay up to date. Even when reasonable legislation exists, there may be little or no enforcement.

POOR COMMUNITIES

In countries which are still developing economically, projects may be sited in or close to poor communities. By providing work for some of the local workforce, the community may become divided. Hiring and firing of workers can then lead to conflict and a risk to the safety of site personnel. Hierarchies in the community also need to be understood otherwise the choice of health and safety supervisors may prove ineffectual with some individuals being unable to correct the behaviour of others.

CLIENT

It is not uncommon for a country's Government to also be the client of large engineering projects. This can have its benefits but also can lead to serious complications. The benefits may be the amount of assistance provided to the project in obtaining materials and equipment or support in responding to, or overcoming, restrictive legislation. Complications are certain to exist where the Government asks for quotas for local workforce or materials and equipment, which could struggle to meet required standards or the insistence that named sub-contractors are used which then, by the nature of their relationship with the client, are difficult to control.

LOCAL ADMINISTRATION

An understanding of the way that a country is run on a national level may not be sufficient preparation to deal with the local political situation. An understanding of the local hierarchy in a 'village' or area needs to be understood when placing workers in positions where authority over others may be required.

The very existence of a project is likely to cause an imbalance in small populations if it becomes the main employer for an area.

ETHICS

All major engineering companies should have in place an ethical policy that will dictate how projects impact on the area. The policy will have ideals for protecting the safety and health of workers and the local environment. However, some of the items already mentioned will place incredible pressures on achieving these ideals.

What you should do

- Ensure policies for dealing with corruption are established prior to starting work
 - Take advice from local legal experts
 - Work out likely effects of working with client and related contractors
 - Determine if level of bureaucracy is greater or less than used to
-

2.6 Personal Protective Equipment

Personal protective equipment is unlikely to be produced in many developing countries to the standards required. Once the equipment is obtained it may prove difficult to persuade workers to use it. It is very likely that they will not be used to wearing protective equipment while working



Equipment Check, Hong Kong

Examples¹

China – The status of the provision of Personal Protective Equipment (PPE) for workers is that the most common PPE provided are gloves, hard hats and eye goggles (all 100%) followed by safety shoes (35%) ear plugs (15%) and face shields (12%). However, many workers consider that hard hats are not convenient for their operations (Tam et al 2004).

Uganda - In Uganda there are hardly any safety provisions on the majority of construction sites. On the other hand many workers do not use the personal protective equipment issued to them (where this is company policy) whereas it is for their own protection. This has a negative bearing on their productivity (Lubega et al 2004).

Tanzania - Lack of safety plans and procedures was evident from the research analysis because most of the construction firms lacked management support in initiating and implementing safety programmes. As a result, workers were not provided with the necessary Personal Protective Equipment (PPE) and in a few sites the workers were provided with uncomfortable PPE (Mbuya & Lema 2002).

India - Indian women generally carry items on their heads and hard hats have been redesigned in some cases to accommodate this.

¹ These are examples taken from published literature and may not be representative of the country as a whole, nor are infrastructure issues unique to these countries. Citing these examples does not constitute approval of the practices by the authors or publisher.

AVAILABILITY

Complications can arise when importing if the country is highly bureaucratic and equipment may be held in a warehouse for months while it is needed on site. The initial cost of having the equipment made in the country will usually be small but there could be 'additional' ad-hoc payments required before the goods are delivered. Compromises may also have to be made if testing and certification of the equipment is not achievable.

ANTHROPOMETRICS

Provision of equipment with sizes used in developed countries may not be suitable for use, especially with regard to glove and boot sizes. Some adaptation may have to be made for the equipment to be used.

BEHAVIOUR

In order for widespread use of PPE to be achieved a behavioural change needs to be encouraged. Another problem is that the equipment, especially safety shoes / boots, may be removed from site and sold on the black market.



Women Carrying Concrete,
India

What you should do

- Find out range of sizes of workers before purchasing equipment
 - Develop methods to stem flow of equipment onto black market
 - Use reinforcement of good behaviour for wearing of PPE
 - Involve workers in design of locally produced PPE
-

2.7 Security

The management of health and safety on mobile work sites is always reliant upon good security. However, in developing countries security may have to be extended beyond the boundaries of the site. Consideration may have to be taken regarding the transit of workers to and from site and monitoring of the political stability of the country as part of site evacuation plans may be required



Lifting Operations, China

Examples¹

Russia - Payroll costs are less in the former Soviet States compared to the West. However, inevitable costs such as business accommodation and security measures are comparable with the West or higher (Khazanet 2002).

Estonia - From an economic and social viewpoint, British people live with a level of security familiar to only a small proportion of the world's population. Most British people do not appreciate this. Although it is recognised that there are security problems further a field often the situation in countries closer to home, such as Estonia, are ignored (Ryan-Collins 2002).

Malaysia – Supervisor told worker that the work he was doing was wrong. The worker took offence and attacked the supervisor with a crowbar.

Nigeria – Workers on site could be violent if they were told off. One supervisor had his leg broken in an incident that occurred off site and out of work hours.

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Site Security Information, Hong Kong

ACCESS TO SITE

The control of authorised personnel on a large site can prove difficult especially with the large turnover of staff that can occur in developing countries. The consequences of unauthorised personnel on site can range from unsafe working activities carried out by employees who have not received the correct training to terrorist activities.

LOCAL POLICING

It would be wise to establish policing levels in the immediate area as this could affect the procedures for dealing with accidents on site and how to deal with civil disobedience in areas outside the site. This will have an effect on the day to day running of the project unless the work is to be carried out in a very remote area.

CIVIL UNREST

Developing countries may be subject to widespread unrest. This may, if political conditions become unstable, provide a risk to the security of the site and staff.

THEFT OF EQUIPMENT

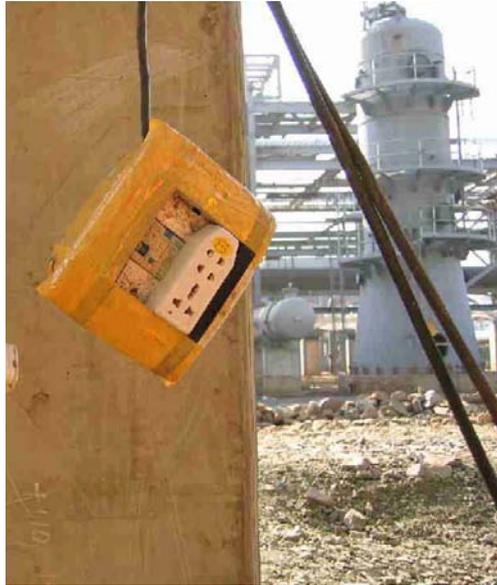
The most mundane of objects on a construction or engineering site may prove to be of great value to local people. Whilst this can be inconvenient and have cost implications at the construction stage, it can lead to catastrophic consequences if the components are removed during commissioning.

What you should do

- Find most appropriate identification system to control admittance of authorised personnel (photo identification cards, finger printing, signed security passes)
 - Monitor likely escalation of civil unrest and put in place evacuation plans for staff
 - Make an assessment of the value of equipment and materials to the local community and adjust security arrangements accordingly
 - Staff going to these countries should be provided with re-orientation training
-

2.8 Use & Abuse of Equipment

Construction workers will always find novel ways to use the equipment provided. In developing countries the use of equipment is subject to lower levels of regulation and therefore the way they use equipment is likely to be hazardous to their own and other peoples safety



Unsafe Electrical Installation,
China

Examples¹

India – Because of the availability of cheap labour, when sophisticated equipment is used, the payback is very important so it will be used continuously with operators working in shifts. Therefore safety implications of working at night need to be considered as well as maintenance of the equipment.

China – Scaffold supervisor found that most of the workers provided by the sub-contractor had never put scaffold up before. For those that had, they had only worked to a low standard. When insisting on timber toe boards, the timber supplied was unsuitable because it was still growing so metal toe boards were used. It was not possible to provide timber ladders because timber locally was an important commodity used for firewood, so metal ladders were built into the scaffold. As the scaffolding was hired, the sub-contractor would not cut the scaffold poles because they had to be returned as provided.

Poland – Contractor unable to use lifting equipment made, certified and delivered from neighbouring Germany because the German regulations were not as robust as those in Poland.

Tanzania - There is serious shortage of construction equipment and spares in the country. This is due to:

- the low purchasing power of local contractors
- lack of commercial plant hire companies
- poor management of existing equipment
- lack of information on equipment suppliers, and
- a lack of reliable work opportunities (Materu 2002).

Uganda - Training is among the measures recommended in minimising causes of major accidents in Uganda (Lubega et al 2000).

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MACHINERY

Certification is essential in the safe use of equipment on construction and engineering sites. In developing countries, there will be many attempts to bring equipment onto site that is uncertified and unsafe. If you ask for a certificate they will be able to 'produce' one. Therefore it will be necessary to have your own methods to check equipment and to have a good visual means of identifying the equipment that has passed your checks.



Damaged MEWP, Poland

VEHICLES

Accidents involving vehicles are one of the main causes of injury on construction sites worldwide. Most sites in developing countries are likely to have less vehicles because of the labour intensive methods of work adopted. Also, because of the cheap labour there will be more workers on sites and they will be less used to safely working around vehicles.

REGULATIONS

Outside of the European Union the bureaucracy can be a great wonder. Poland in particular has a great enthusiasm for paperwork. This makes life difficult in complying with the regulations but has little beneficial effect on the work on site because the regulations, as with many eastern European countries, are not adequately enforced.

TRAINING

It is likely that workers from developing countries will have received little or no training on how to conduct themselves on a construction site and this will increase the likelihood of them being involved in accidents or working in ways likely to be hazardous to their health. This is stated as a contributory reason for 40% of work-related deaths in Houston, Texas, involving workers with Hispanic surnames (Flory 2001).

INCENTIVES

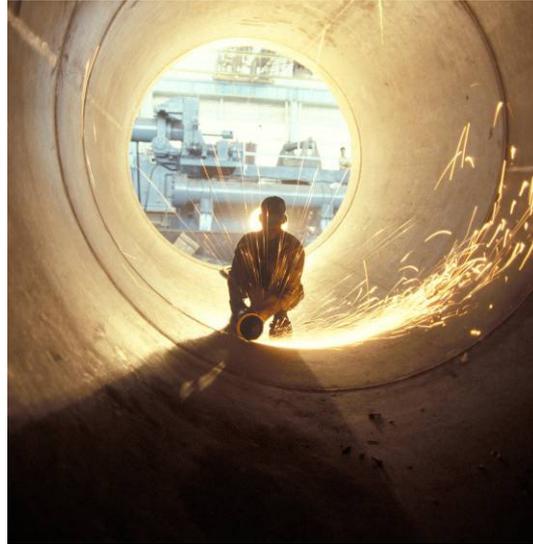
Safety in construction practices is another area of major concern in developing countries. Particularly subcontractors and their workers providing formwork and scaffolding services cannot be easily regulated or made to comply with the contractual requirements for safety. Motivation in the form of bonuses for organising a safe and accident free site has been found extremely useful (Keskoni & Siddiqi 2002).

What you should do

- Be prepared to deal with greater than expected amounts of paperwork to satisfy bureaucratic demands of host country
 - Have your own system of certificate of equipment on site that enables quick visual checks for compliance
 - Provide additional training for workers for example with the safe use of vehicles and safe working around vehicles
-

2.9 Vocational Skills

Available local skills will have an effect on the health and safety of a project. This will, of course, be affected by the type of project and the level of work previously carried out within the area. Consideration has to be made on whether to train local workers in the skills required or import skilled workers from other areas



Construction Worker, India

Examples¹

Kuwait - Most construction workers in Kuwait are unskilled, untrained, and inexperienced, especially after the liberation. They come from poor communities of other countries and are ready to work in any job to establish a reasonable life for their families; many do not see their families for 2 to 3 years in order to save some money for the future (Kartam et al 2000).

Indonesia - Contractors are still facing a lack of trades' skills to complete a project satisfactorily. In fact, interviewees stated that "skilled" operators were often not skilful, having gained their experience on the job site, learning construction skills through trial and error (Alwi et al 2000).

Bangladesh - The high accident and fatality rate in Bangladeshi construction is partially due to the shortage of adequately trained craftsmen (Koehn et al 2000).

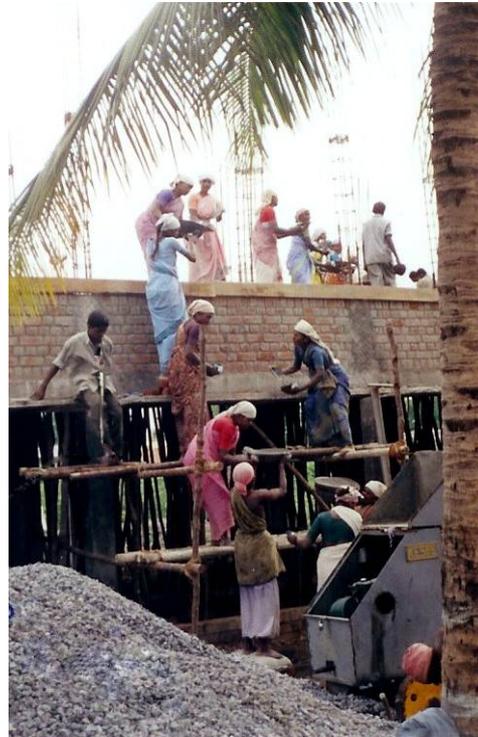
Caribbean - Human resource development is often not seen as a priority in developing countries. In the English-speaking Caribbean, for example, much of the construction labour force tends to have little formal education beyond the primary school level, although these individuals are inherently very intelligent. Construction skills tend to be acquired by experience, rather than by formal instruction, except, of course, in specialized areas such as electrical and air-conditioning work (Forbes et al 2002).

Sri Lanka - The Sri Lanka construction industry faces a challenge in developing a strong structural base through manpower training and appropriate construction resources since more craftsmen and equipment operators are needed to maintain a skilled, competitive and adequate workforce to meet new demands in the industry (Weddikkara & Devapriya 2002).

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LEGISLATION

Organisations representing the interests of the poor in developing countries are concerned that globalisation has introduced negative effects such as relative decline in wages for unskilled work, increased risk and vulnerability, and the declining bargaining power of unskilled labourers. Direct intervention is required to slow the pace of reform or opening up, as in the case of the mechanization of the construction sector. In all cases, direct interventions to enhance the skills of the poor, and to develop insurance tools to manage the risks they face, will be crucial. These interventions need to combine government action with action by organizations representing the poor (SEWA).



Construction Work, India

SKILLS

Where the indigenous skills level is high, local workers can be employed. This overcomes many of the problems associated with language barriers and understanding of cultural differences as well as housing and welfare challenges.

CERTIFICATION

An understanding of the methods used to determine skills level is required when working in different countries. For instance, in the former Soviet countries a tariff system exists where workers are graded from 1 to 6 on competency in construction work. Levels 2 or 3 require attendance at an appropriate technical school and higher levels are determined through a construction commission at which time the worker achieves foreman status (Khazanet. 2002).

What you should do

- Determine whether host country has certification scheme for construction trades
 - If this is the case check skills levels of certified workers
 - Where there are skills shortages determine if migrant workers can be used
 - If the use of migrant workers is restricted allow for additional training, with more staff, to raise the skills levels of workers available
-

2.10 Weather Extremes

Although extreme climate conditions are not restricted to industrially developing countries, they are more commonplace than in industrially developed countries. With extreme conditions (excessive heat, sub-zero temperatures and tropical storms) come health considerations for the workforce, primarily due to direct exposure to the elements but also resulting from carrying out construction work in extreme conditions



Water Provision in Hot Conditions, Qatar

Examples¹

Antarctica – Working on research stations at the South Pole, in extreme cold, cranes will not run until it is -50F (-46C) or below. Caterpillars and forklifts require temperatures above -60F (-51C). Even after the machines stop working, people keep going. They continue to labour in 35 mph (56 kph) winds with temperatures 65F below (-54C). Construction rarely stops – only when visibility becomes so bad that people are liable to become lost between buildings will work stop. Hammer heads have been known to break in half and chisels shatter (Hutchinson 2001).

Kuwait - Apart from direct construction accidents in Kuwait, hazards arise from extreme weather conditions in summer, when temperature is usually greater than 110-F, often adversely affecting the worker's state of mind and attention (Kartam 2000).

Nigeria – At Port Harcourt, contractors have to make allowances for severe local weather conditions with at least one fatality of a construction worker occurring due to a lightning strike. Sudden and violent storms are fairly common in that area and most workers who are aware of this take shelter as storms approach.

Qatar – With temperatures in excess of 40 degrees Celsius, air-conditioned mess huts were provided for workers but they chose to find shade and breeze to rest in. This was partly because they did not like air conditioning but mostly because many of the workers came from similarly hot countries and were used to dealing with the heat.

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Winter Conditions, China

HEAVY WORK IN TROPICAL CONDITIONS

Several possibilities are available to reduce load:

1. Better work organization of work for:
 - materials handling (a critical operation for almost all involved)
 - the non-productive times: walking distances, waiting times (standing or sitting) and the periods of exposure to the sun
2. Shelters to protect against the sun and electrical fans can increase the cooling effect of evaporation, and beverages can help the body keep its water balance.
3. For piling work, another type of economic management is advised. Subcontracting where the work is paid per pile incites the operators to go beyond their maximal capacity (Yoopat 2004).

WEATHER ANOMALIES

Where local conditions dictate (storms, drought, avalanches) ensure that workers are aware of the likely conditions and that measures are in place to protect the workers in the event of these conditions arising.

COLD CLIMATES

Ensure workers are provided with thermally insulated clothing for winter conditions. Safe exposure limits to be established and work schedules adjusted to suit seasonal changes. Equipment to be checked for use in sub zero conditions.

HOT CLIMATES

Workers need to understand consequences of not protecting themselves from effects of the sun. Measures to be taken to ensure workers do not suffer from dehydration. These to include rest breaks during the day.

What you should do

- Obtain detailed report on local weather conditions
- Provide facilities for workers that they will use
- Advise workers on measures to protect themselves from the weather
- Alter work schedules to fit weather conditions
- Provide physical protection (shelters, sun screen, insulated clothing)

2.11 Workers

An understanding of the environment (physical, political and cultural) that work has to be carried out in together with control of organisation of the tasks and equipment use will not be sufficient to deliver successful health and safety standards in developing countries. Physical and behavioural characteristics of the workers need to be considered



Women Construction Workers,
Bangalore

Examples¹

China - In the construction industry, many workers are forced to work overtime to meet deadlines or to make up for time lost due to bad weather. In certain townships, excessive working hours are not only affecting workers' health but can also lead to increased occupational accidents (International Labour Organisation 1998).

South East Asia - Managements of construction companies, in developing countries, are familiar with morale boosting practices, which vary with region and culture. For instance in Southeast Asia managements announce a feast following each big concrete pour for all workers. All staff and workers of subcontractors present during the pour are invited to the feast. Benefits accrued are in the form of faster and more efficient pour and extra vigilance on safety (Keskonis & Siddiqi 2000).

India - On average, women worked 9 hours, with half an hour for lunch and one 10 to 15-minute break morning and afternoon. Every woman worked for approximately 20 to 25 days in the non-rainy season and received on average 80-120 rupees (US\$ 3) per day. Even though the women did tougher jobs than the men, there was a wage difference of 10-30 rupees for women for unskilled manual jobs (Priya 2000).

China - One of the characteristics of the Chinese construction industry is the existence of a large number of peasant workers, who receive little education and are unskilled, untrained, and inexperienced. They come from poor provinces and are ready to take up any jobs to earn a reasonable living for their families. Due to relatively low requirements for skills in construction, the industry has been overwhelmed with peasant workers (Tam et al 2004).

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RISK AWARENESS

The risk awareness of workers in developing countries needs to be understood as this will have an effect on the approach to health and safety training adopted. During training, workers need to be assured that their experiences (which could be anything from armed conflict to working in very dangerous conditions) are understood but they still need to appreciate that, although the risks on site may seem to be small in comparison, they can still cause considerable harm.

ANTHROPOMETRICS

An understanding is required of the variance of the physical size of workers and how this affects tasks carried out and the use of work equipment. Body measurements vary as a function of age, sex and for different ethnic populations (Sanders and McCormick 1992). For example, if a piece of equipment was designed to fit 90% of the U.S. male population, it would fit only 45% Japanese, 25% Thais and 10% Vietnamese (Ashby 1979).

HEALTH

The health of workers worldwide is likely to be affected by their life outside of work. If they have been living off a low income and working long hours, their general fitness levels may not allow them to perform the tasks required of them by the project and if fatigued, they may represent a risk to the health and safety of themselves and others. This aspect is relevant in all countries, but may be more widespread in developing countries.



Construction Workers, India

WOMEN

Some countries have different ideas about women being employed in heavy industries and it is not uncommon to find women working on construction sites in India and China. Whilst this should not require any meaningful alterations to normal health and safety plans, an appreciation of their presence on site is essential.

CHILDREN

Child labour is used in some developing countries and whilst it may be easy to identify pre teen children, older children may find their way onto site.

What you should do

- Use local workers to assist in the identification of teenage children seeking to gain access to the site
 - Find appropriate incentives that works best of each nationality of worker
 - Make allowances for the possible presence of women labourers
 - Monitor new start workers for possible fatiguing effects of previous work
-

2.12 Workers Families

A majority of countries in the world put great onus on the importance of the family and extended family. So when construction and engineering organisations from developed countries carry out work in these countries the impact (presence of family members on site and substitution of family members at work) of the workers' families on the running of projects is often overlooked



Foundation Excavation, India

Examples¹

Pakistan - Families of workers registered 1,855 cases against employers but courts are usually sympathetic towards employers, and only award compensation to workers who prove an accident is due to negligence by employers. This is rarely easy for workers to prove (Awan 2002).

Thailand - Women and children work many hours in small-house construction, although no precise figures on these are available. The family follows the construction workers (skilled or unskilled) around the country, living temporarily in modest to poor conditions on the construction site and moving to another site when the job is finished. Their salary is much lower than the official salaries and they have no social security status. The working conditions are difficult to keep under control, and any accidents or diseases that occur are not registered (Yoopat 2004).

Botswana – The attitude of local workers towards work was relatively poor while the foreign workers were viewed as hardworking. When asked the basis of such opinions most managers felt foreign workers were organised, focused and meant business as they had to competitively sustain their employment so as to be able to remit part of their earnings to their families back home (Mselle & Kgaue 2000).

Zambia - The PUSH (Peri-Urban Self-Help) food for work programme that carried out activities like road and drainage improvements in settlements like Kalingalinga initiated by the NGO CARE showed that women can be actively involved in the construction industry given the right incentives, in this case food for their families (Mususa & Wood 2000).

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HEALTH

Food sanitation and housing problems are challenging issues at most construction sites. Outbreaks of food poisoning are a particular concern. Stress and family problems caused by shift work are another concern among construction workers. Some parents need to bring their children with them from place to place, thereby preventing the children from getting a school education. Poor access to health care is another constraint that worsens the situation (Juengprasert 2004).



Women Working on Construction Site, Vietnam

JOB SECURITY / COMMITMENT TO EMPLOYMENT

It should not be assumed that if steady, well paid work is provided that a stable workforce is ensured for the duration of a project. Many workers are used to casual employment whereby they may only stay on the project until enough money is earned to enable them to leave and pursue other interests or commitments. If there is no history of saving for the future, the attitude may be 'why start now?' Workers may want to earn money to leave the country or, once trained, to use their new skills to work on other projects.

The result is that workforce turnover may be excessive leading to a considerable amount of extra health and safety training of staff and increases the likelihood of injury due to high numbers of new workers being present throughout the project.

TRAINING

Many workers may provide the only financial support within a large family group. Workers' families can be used to drive home health and safety messages by emphasising the importance of keeping safe on site in order to continue to provide for the family.

SUB CONTRACTORS

In some countries you may find that it is usual for some specialized areas of work to be undertaken by a sub contractor that is run by a family unit with all members of the family carrying out the work. If the work has been sub contracted out several times it may be that you have little control over their choice of workers.

What you should do

- Make provision for presence of workers' families close to the works
 - Find out details of workers' dependants
 - Use greater value of family unit in training material to drive home importance of workers keeping safe and healthy
 - Prepare contingency plans for dealing with family members wanting to work on site
-

SECTION 3.0

CAMEOS & NOTES

This section includes single sheet descriptions of breaches of health and safety with details of solutions used to correct them and several pages of 'notes' taken during the research relating to some of the problems encountered while working in developing countries

3.1 Infrastructure



Construction workers travelling to work

If a country does not have an established public transport system they will use whatever means are available to get to work. This puts the safety of workers at risk before they arrive on site

Where poor road networks exist rivers are regularly used to transport goods and materials. The methods used may sometimes push the safety levels to the limit



Overloaded barge



Lorry in desert carrying mattresses

Even when the goods do not overload the vehicle their bulk may prove to be hazardous to other roads users

3.2 Local Practices

WELDING OPERATIONS

This work was being carried out with the operators using one hand to hold the wooden handle on the welding mask. When advised that this did not satisfy the health and safety requirements of the contract and that they should have both hands free to operate the welding equipment, the masks were adapted by the addition of a bent piece of welding rod. The bent rod was held in the operator's teeth, keeping their hands free to do the work.



Welder holding mask



Bent rod fixed to mask

SOLUTION ADOPTED

Approved masks then had to be imported and were not available for some time into the contract. When introduced, many disappeared from site until workers were encouraged to keep hold of them.

Final cost for the provision of welding masks was many times the budgeted cost.



Approved mask

3.2 Local Practices

Left to their own devices workers in developing countries will use quick and simple platforms to carry out work



Bamboo platform erected on steel frame



Access to work areas will be constructed in a similar manner

Ramp access to work on shuttering

But once they start to work safely at height – the sky's the limit



Fall arrest system for roofing work

3.2 Local Practices



Steel fabricated baskets to hang off steel girders

In developing countries where there are no mobile elevated platforms to work from, steel baskets are widely used

Cranes are used to place the baskets or support them while being used



Worker supported in basket attached to crane



Small steel basket to support worker

In some cases the baskets are simply lowered into place by hand

3.3 Personal Protective Equipment

SAFETY HATS

It is usual to find Indian women carrying items on their heads. It is also usual to find women in India working on construction sites. The standard European safety hat interferes with this activity.



Woman Construction Worker,
Bangalore

SOLUTION ADOPTED

In order to improve safety on construction sites in India some power generating companies worked with the women on their sites to develop a customised safety helmet. The new helmet allowed them to be protected on site when they were not working and to be able to carry out their manual handling work while still wearing the helmet.



Women Construction Workers,
Jamnagar

3.4 Use & Abuse of Equipment

EYE PROTECTION

Welders were found to be removing the inner eye shield from welding masks for their own convenience. This meant that when the outer shield was flipped up their eyes became exposed to any flying particles from their work.



Worker wearing welding mask



Safety glasses worn under mask

SOLUTION ADOPTED

When it was found out what the workers were doing to the equipment it was decided after discussion with them that an acceptable solution for both parties was for secondary eye protection in the form of safety glasses to be worn under the main masks to restore the eye protection.

3.5 Security

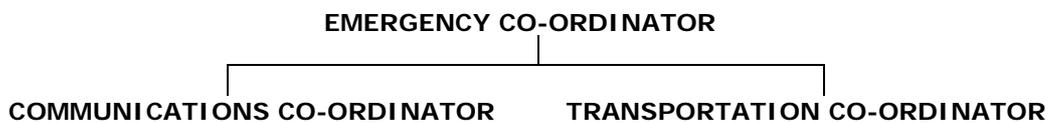
CRISIS MANAGEMENT – The information below represents the outline of one company's crisis management procedures

The Evacuation Plan is an approved plan for systematic withdrawal or evacuation of all personnel and dependants in the event that their safety can no longer be assured.

The decision-making for evacuation is the combined responsibility of the home country, the Emergency Committee and the project's Emergency Co-ordinator.

In all cases, the first step is to co-ordinate with the relevant embassies.

KEY PRINCIPALS



Each of these shall have a deputy who will take over their responsibilities in their absence.

EMERGENCY CO-ORDINATOR (EC)

- The EC is to direct personnel / dependants whether to evacuate
- In the event of an alert, the EC will inform team leaders who will inform personnel ensuring everyone is notified
- Details of those who cannot be contacted to be passed back to the EC
- The EC will initiate appropriate action to locate unaccounted-for personnel
- The EC is to maintain a list of all personnel and dependants not on site or in their residences and their travel details

COMMUNICATIONS COORDINATOR (CC)

- The CC should be known to the relevant embassies and receive security updates from them
- The CC is to monitor reliable short wave broadcasts
- If contacted during an alert, personnel / dependants are to report to site assembly point, local company office or return to their residence
- Under a prolonged state of alert, personnel are to stay close to means of communication

TRANSPORTATION CO-ORDINATOR (TC)

- The TC is to control international travel for any evacuation
- Under no circumstances are individuals permitted to depart without arranging this with the TC during an alert phase
- Under a prolonged state of alert, all travel by personnel / dependants to be closely monitored
- If a decision has been made to evacuate dependants, any personnel wishing to do so may also evacuate

GENERAL

- All personnel and dependants to be given details of assembly points, key personnel contact details and useful local information
- Individuals and families are to have emergency packs (travel packs containing all documents / currencies / snack food and personal medical supplies) ready for evacuation at short notice
- Personnel need to have flexible plans as it is impossible to prepare for every contingency
- The Evacuation Plan will only work if principals and employees understand their duties and responsibilities

NOTES

Local Practices

Injuries on our site mainly occurred to the hands and arms due to falling objects

Workers were beaten by foremen to achieve project target deadlines

When a lorry delivering equipment to the project broke down, the driver saw driving as his only duty and made no attempt to fix the problem, waiting instead for a mechanic to turn up

Language

It was important with so many languages on site to arrange that signallers and crane operators used the same language to avoid misunderstood communication

Extreme Weather

The site had to be closed for three months during the extreme cold winter

Two construction workers were killed by a lightning strike during a violent storm as they walked away from the construction site

There had to be close control over the work environment and protective equipment as work was carried out in sub zero temperatures down to -45°C

Use and Abuse of Equipment

The workers would use the specialist equipment for the job where they had been specifically trained to use it, but then revert to more basic tools on jobs where they hadn't been specifically instructed to use it

NOTES

Infrastructure

In China a whole village was relocated and the creation of the garden in the new village pleased them more than anything else

Security

Security is different from country to country.
In Venezuela every-one has guns

Politics

Most countries have a legislative framework in place and the environmental legislation is usually at a higher level than that of health and safety

Managing health and safety on projects in developing countries is possible if there is an international client and an international sub contractor. In Iran the government insists on seventy percent local sub-contractors

Literacy

One construction company has developed a manual that illustrates safe working practices without words. The hazards of the workplace are displayed in cartoon pictures showing the right and wrong way to behave in situations such as using equipment and manoeuvring around the workplace. As well as the book overcoming problems with illiteracy in the workforce, it does not require translating.



Example of word free safety poster

Vocational Skills

Women in South Africa are under represented on construction sites despite traditionally being the architects and builders of their own homes

NOTES

Workers

We wanted to get the health and safety message across in Africa so we handed out Zidane football shirts as incentives

Workers have a different risk perception in China because there are more people killed at work than there are on the roads

A zero tolerance policy was executed on alcohol as this was a major problem in Russia

An Austrian company won work coating ducting in UK. The Hungarian team of workers with Czech supervision tried to do the work without breathing equipment

Personal Protective Equipment

A pregnant woman was killed when her long flowing clothing got caught in construction machinery while working on the construction of a large engineering project

Workers' Families

There were children on the site and when we tried to enforce the sixteen years age limit, suddenly they were all 'sixteen'

The women workers on site brought their children with them. The children were involved in accidents where the mothers were carrying heavy loads

SECTION 4.0

ASSESSMENT TOOLS

This section provides tools to further knowledge of the areas of concern when working in developing countries

4.1 Management Process

This process aims to provide assistance in the revision of health and safety management plans / strategies to accommodate circumstances likely to be encountered when working in developing countries. It has been developed using knowledge accrued from the Constructing Global Health and Safety project and is not intended as a replacement for any existing plans / strategies.

Desk study

- Read relevant sections of this manual
- Use assessment tools
- Consult reference websites / books for information on culture and language

Reconnaissance (before work commences)

- Details of infrastructure
- Dates of national / local holidays and religious festivals
- Information on available workforce
- Standards of construction equipment
- Construction legislation
- Political stability

Contract documentation

- Ensure findings from reconnaissance allowed for
- Check client relationship's affect on H & S

Work on site

- Use local staff if possible
- Monitor effectiveness of H & S training
- H & S materials designed to suit language and illiteracy levels

Post contract reporting

- How did work go?
- What barriers existed in the implementation of health and safety?
- Update working in developing countries guidelines

4.2 Assessment Tool

1.0 Infrastructure	1.1 Roads	1.2 Hospitals	1.3 Food
2.0 Language	2.1 Number of different	2.2 Ease of translation	2.3 Availability of interpreters
3.0 Literacy	3.1 Recorded level of	3.2 Rural / Urban	3.3 Local education
4.0 Local Practices	4.1 Informal activities	4.2 Traditional methods	4.3 Labour costs
5.0 PPE	5.1 Availability of equipment	5.2 Methods to retain	5.3 Recorded abuse of
6.0 Politics	6.1 Legislation	6.2 Client	6.3 Corruption
7.0 Security	7.1 Terrorism	7.2 Site location	7.3 Access
8.0 Use of Equipment	8.1 Lifting	8.2 Electrical work	8.3 Vehicles
9.0 Vocational Skills	9.1 Available locally	9.2 Able to import workers	9.3 Need extra training
10.0 Weather Extremes	10.1 Heat	10.2 Cold	10.3 Other
11.0 Workers	11.1 Incentives	11.2 Risk awareness	11.3 Size
12.0 Workers' Families	12.1 Family on site	12.2 Migrant workforce	12.3 Women workers

HOW TO USE THE ASSESSMENT TOOL

1. The main issues have each been split into three separate sections
2. For each section using the scoring hints, score between +5 and -5
3. The higher the score the smaller the health and safety problem
4. +180 is the best health and safety conditions and -180 would be the worst

Therefore the higher the score the less adjustment is required for cultural issues and a negative score for any section means that it has to be addressed. Whilst the scoring approach can only ever be subjective, the process of considering the issues raised should act as an encouragement to consider the key issues.

4.2 Assessment Tool

1.0 INFRASTRUCTURE	
QUESTION	SCORING HINTS
1.1 Are the roads suitable for the safe transport of people to work and for emergency vehicles?	Concrete or tarmac roads free from potholes score high. Loose gravel tracks score low
1.2 Is there a hospital within easy reach of the site and does it provide adequate medical services?	Hospitals with 'state of the art' facilities close by scores high
1.3 Can the food requirements of the workforce be met from the local producers?	Many local food suppliers with good competition scores high

2.0 LANGUAGE	
QUESTION	SCORING HINTS
2.1 Will a large number of languages affect the communication of health and safety message on site?	The higher the number of languages on site the lower the score
2.2 Will your health and safety posters and manuals be easy to translate?	Eg. English to French translation score high. Finnish to Philippine score low
2.3 Will translation of the health and safety message slow its delivery?	High number of interpreters available locally score high

3.0 LITERACY	
QUESTION	SCORING HINTS
3.1 Will a low level of literacy affect the understanding of the health and safety requirements?	Low level of literacy score low
3.2 Will the work be carried out by the workers from a rural or urban area?	Urban score high. Rural score low
3.3 Have local education facilities improved the levels of illiteracy in this area?	Good education facilities locally score high

4.0 LOCAL PRACTICES	
QUESTION	SCORING HINTS
4.1 Will informal construction activity influence methods of working on site?	High level of informal construction activities in the area score low
4.2 Do the traditional methods have to be controlled or prohibited?	The higher the amount of modern construction activity in the area the higher the score
4.3 Will the cost of labour ensure that labour intensive methods will be used?	The lower the cost of labour the lower the score

4.2 Assessment Tool

5.0 PPE		
QUESTION	SCORING HINTS	
5.1	What is the availability of PPE?	Obtained locally to the required standard scores high. Have to import or manufacture locally score low
5.2	Is there a black market for the protective clothing you are providing?	Score low for high levels of black market activity
5.3	Are the workers in this area used to wearing PPE?	Higher the amount of modern construction activity in the area the higher the score

6.0 POLITICS		
QUESTION	SCORING HINTS	
6.1	Will the level of legislation and its enforcement have an affect on the project?	If using your own regulations with little external enforcement score high If using local regulations with little enforcement score low
6.2	Will the client impose any restrictions on the work?	Local client requiring local workers and equipment scores low. International client supportive of health and safety scores high
6.3	Are you aware of corrupt practices that may have an affect on the management of H & S?	High levels of corruption score low

7.0 SECURITY		
QUESTION	SCORING HINTS	
7.1	Will the recorded level of terrorism threat need to be accounted for?	High level of terrorism threat score low
7.2	Can the boundaries of the project be easily secured?	The easier it is to secure the boundaries the higher the score
7.3	Is the control of personnel on site easy to achieve?	Large (>1000) numbers of workers with local security guards score low. Small numbers (<1000) with secure identification system score high

8.0 USE & ABUSE OF EQUIPMENT		
QUESTION	SCORING HINTS	
8.1	Will the lifting work be carried out by local contractor?	Large amount of lifting and have to use local expertise score low
8.2	What standards will the electrical workers be using?	Large amount of electrical work and have to use local expertise score low
8.3	Will vehicles be used safely on site?	All vehicles provided under the contract and only to be used by trained operative scores high. Many sub contractors bringing own vehicles onto site scores low

4.2 Assessment Tool

9.0 VOCATIONAL SKILLS	
QUESTION	SCORING HINTS
9.1 Can the provision of skilled workers be catered for locally?	Good availability score high
9.2 Will the importing of the required skilled workers provide other health and safety risks?	Low level of local skills and not able to import workers score low
9.3 Will a large percentage of the workforce have to be trained to do their job?	No skills available and have to train from scratch score high

10.0 WEATHER EXTREMES	
QUESTION	SCORING HINTS
10.1 Will the cold weather prevent the workers from working normally?	Prolonged periods with temperature below 0°C score low
10.2 Will the hot weather prevent the workers from working normally?	Prolonged periods with temperature above 28 °C score low
10.3 Will the storms weather prevent the workers from working normally?	Areas subject to tropical storms score low

11.0 WORKERS	
QUESTION	SCORING HINTS
11.1 What incentives can be used to encourage the workers to follow health and safety guidelines?	Higher the cost of the incentives lower the score Less likely workers respond to incentives lower the score
11.2 Will the gulf between the risks in the workers lives and those on site affect their behaviour?	War torn area score low
11.3 Will the size of the workers affect the choice of PPE or the equipment used?	E.g American equipment used by Vietnamese scores low German equipment used by Polish workers scores high

12.0 WORKERS' FAMILIES	
QUESTION	SCORING HINTS
12.1 Will family members on site overrule health and safety instructions?	Score low if many family members will be present on site
12.2 Is the majority of the workforce living away from their families?	Large number of workers living away from home score low
12.3 Will women workers bring their children onto site?	Score high if provision has been made for workers children – 'crèche'. Score low if number of women on site is high or unknown

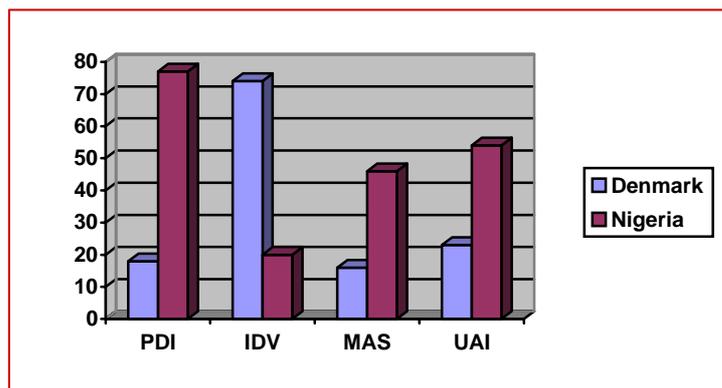
4.3 Cultural Understanding - Geert Hofstede

Prof. Geert Hofstede (GH) conducted perhaps the most comprehensive study to date of how values in the workplace are influenced by culture. Hofstede analysed a large data base of employee values scores collected by IBM between 1967 and 1973 covering more than 70 countries, from which he first used the 40 largest only and afterwards extended the analysis to 50 countries and 3 regions. In the editions of GH's work since 2001, scores are listed for 74 countries and regions, partly based on replications and extensions of the IBM study on different international populations.

From the initial results, and later additions, Hofstede developed a model that identifies four primary dimensions to assist in differentiating cultures: Power Distance - PDI, Individualism - IDV, Masculinity - MAS, and Uncertainty Avoidance - UAI.

Example

As you can see from the table below the cultural characteristics of the two countries shown could hardly be more diverse.



Geert Hofstede's research gives us insights into other cultures so that we can be more effective when interacting with people in other countries. If understood and applied properly, this information should reduce your level of frustration, anxiety and concern. But most important, Geert Hofstede will give you the 'edge of understanding' which translates to more successful results.

For further information

Culture's Consequences: Comparing Values, Behaviours, Institutions, and Organizations Across Nations, Geert Hofstede, Second edition 2001. Sage publications, London.
<http://www.geert-hofstede.com/>

4.4 Hofstede's Cultural Dimensions¹

POWER DISTANCE INDEX (PDI)

Focuses on the degree of equality, or inequality, between people in the country's society. A High Power Distance ranking indicates that inequalities of power and wealth have been allowed to grow within the society. These societies are more likely to follow a caste system that does not allow significant upward mobility of its citizens. A Low Power Distance ranking indicates the society de-emphasizes the differences between citizen's power and wealth. In these societies equality and opportunity for everyone is stressed.

INDIVIDUALISM (IDV)

Focuses on the degree the society reinforces individual or collective achievement and interpersonal relationships. A High Individualism ranking indicates that individuality and individual rights are paramount within the society. Individuals in these societies may tend to form a larger number of looser relationships. A Low Individualism ranking typifies societies of a more collectivist nature with close ties between individuals. These cultures reinforce extended families and collectives where everyone takes responsibility for fellow members of their group.

MASCULINITY (MAS)

Focuses on the degree the society reinforces, or does not reinforce, the traditional masculine work role model of male achievement, control and power. A High Masculinity ranking indicates the country experiences a high degree of gender differentiation. In these cultures, males dominate a significant portion of the society and power structure, with females being controlled by male domination. A Low Masculinity ranking indicates the country has a low level of differentiation and discrimination between genders. In these cultures, females are treated equally to males in all aspects of the society.

UNCERTAINTY AVOIDANCE INDEX (UAI)

Focuses on the level of tolerance for uncertainty and ambiguity within the society ie unstructured situations. A High Uncertainty Avoidance ranking indicates the country has a low tolerance for uncertainty and ambiguity. This creates a rule-oriented society that institutes laws, rules, regulations and controls in order to reduce the amount of uncertainty. A Low Uncertainty Avoidance ranking indicates the country has less concern about ambiguity and uncertainty and has more tolerance for a variety of opinions. This is reflected in a society that is less rule-oriented, more readily accepts change, and takes more and greater risks.

Explain why these countries were chosen and also where / how you have obtained the other data on the countries – so that they could do the same thing for other countries.

¹ The information on this page is copyright © Geert Hofstede reproduced with permission.

4.5 Country Data Sheets

These sheets provide information related to culture, language, literature and the economy of a sample of countries from around the world. These values can be compared to those from industrially developed countries which have also been included.

To create similar pages the information can be obtained from the following sources:

Culture	http://www.ethnologue.com/
Language	http://www.ethnologue.com/
Literacy	http://portal.unesco.org/education
Economy	http://www.worldbank.org/

Note: the information from developing countries may not be as accurate as that obtained from developed countries. This can be seen in the different values for the literacy levels.

Chile – Country Data Sheet

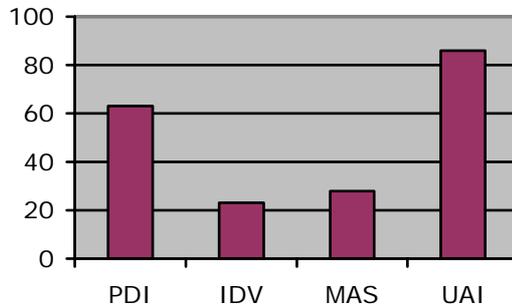
HOFSTEDE

PDI = 63

IDV = 23

MAS = 28

UAI = 86



LITERACY

Adult Literacy Rate (%)

Total	Male	Female
95.7	95.8	95.6

Data Source
2002
Census
UNESCO
Institute for
Statistics
(UIS)

LANGUAGE

Republic of Chile - Approximate Population 15.8M

Number of languages	11
Living languages	9
Extinct languages	2
Literacy rate	92% - 95%

Main language - Spanish

Catalan-Valencian-Balear	
Standard German	(35,000)
Vlax Romani	

ECONOMY

(Current US\$)	2000	2003	2004
GNI, Atlas method	72.7 billion	68.7 billion	78.4 billion
GNI per capita, Atlas method	4,780	4,360	4,910
GDP	75.5 billion	72.4 billion	94.1 billion
GDP growth (annual %)	4.4	3.3	6.1

China – Country Data Sheet

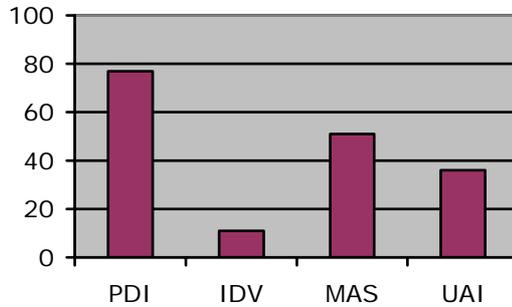
HOFSTEDE

PDI = 77

IDV = 11

MAS = 51

UAI = 36



LITERACY				
Adult Literacy Rate (%)			Data Source	UNESCO Institute for Statistics (UIS)
Total	Male	Female	2001 Census	
90.9	95.1	86.5		

LANGUAGE	
People's Republic of China – Approximate Population 1,299M	
Number of languages	236
Living languages	235
Extinct languages	1
Literacy rate	73% - 76.5%
Main language - Mandarin Chinese	
Regional Languages	
Daur	Uyghur
Kalmyk-Oirat	Xibe
Lu	Northern Zhuang
Peripheral Mongolian	Central Tibetan

ECONOMY			
(Current US\$)	2000	2003	2004
GNI, Atlas method	1.1 trillion	1.4 trillion	1.7 trillion
GNI per capita, Atlas method	840.0	1100.0	1290.0
GDP	1.1 trillion	1.4 trillion	1.6 trillion
GDP growth (annual %)	8.0	9.3	9.5

India – Country Data Sheet

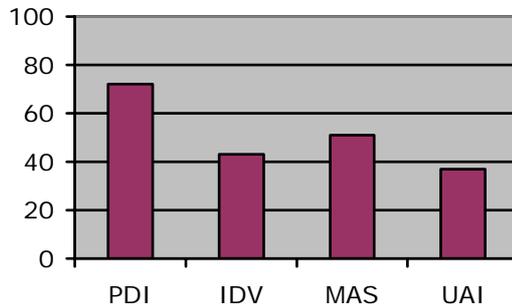
HOFSTEDE

PDI = 72

IDV = 43

MAS = 51

UAI = 37



LITERACY

Adult Literacy Rate (%)				Data Source
Total	Male	Female		UNESCO Institute for Statistics (UIS)
61.0	73.4	47.8		2001 Census

LANGUAGE

Republic of India, Bharat – Approximate Population 1,065M

Number of languages	428
Living languages	415
Extinct languages	13
Literacy rate	36% to 52%

Main languages

Indo-Aryan	777,361,000	76.0%
Dravidian	216,635,000	21.6%
Austro-Asiatic	12,250,000	1.2%
Tibeto-Burman	10,350,000	1.0%

ECONOMY

(Current US\$)	2000	2003	2004
GNI, Atlas method	455.6 billion	571.3 billion	674.6 billion
GNI per capita, Atlas method	450.0	540.0	620.0
GDP	457.4 billion	600.6 billion	691.9 billion
GDP growth (annual %)	3.9	8.6	6.9

Indonesia – Country Data Sheet

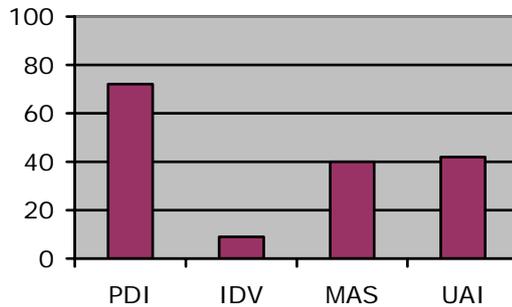
HOFSTEDE

PDI = 72

IDV = 9

MAS = 40

UAI = 42



LITERACY

Adult Literacy Rate (%)			Data Source	UNESCO Institute for Statistics (UIS)
Total	Male	Female	2005 Estimate	
87.9	92.5	83.4		

LANGUAGE

Republic of Indonesia - Approximate Population 238.5M

Number of languages	742
Living languages	737
Extinct languages	3
Literacy rate	78% - 85%

Main language - Indonesian

Other languages -

Dutch	Western Cham
Portuguese	Arabic
Tringgus	
Uyghur	

ECONOMY

(Current US\$)	2000	2003	2004
GNI, Atlas method	122.5 billion	202.3 billion	248.0 billion
GNI per capita, Atlas method	590.0	940.0	1,140.0
GDP	165.0 billion	238. 5 billion	257.6 billion
GDP growth (annual %)	4.9	4.9	5.1

Iraq – Country Data Sheet

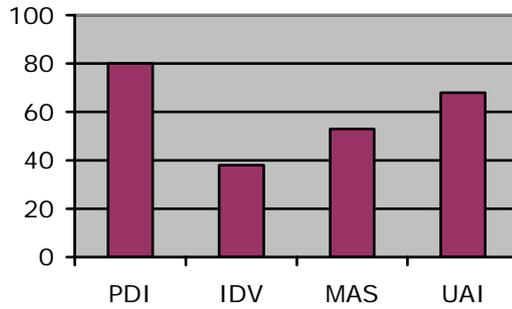
HOFSTEDE

PDI = 80

IDV = 38

MAS = 53

UAI = 68



Figures Shown are for Arab Countries

LITERACY

LITERACY				Data Source	UNESCO Website
Adult Literacy Rate (%)				2006	
Total	Male	Female			
58.0	70.7	45.0			

LANGUAGE

Republic of Iraq - Approximate Population 25.4M

Number of languages	22
Living languages	21
Extinct languages	1
Literacy rate	60% - 70%

Main languages – Standard Arabic, Kurdi

Egyptian Spoken Arabic	450,000
Turkmen	227,000
Turkish	3,000
Turoyo	3,000

ECONOMY

ECONOMY			
(Current US\$)	2000	2003	2004
GNI, Atlas method			
GNI per capita, Atlas method	NO	FIGURES	AVAILABLE
GDP			
GDP growth (annual %)			

Mexico – Country Data Sheet

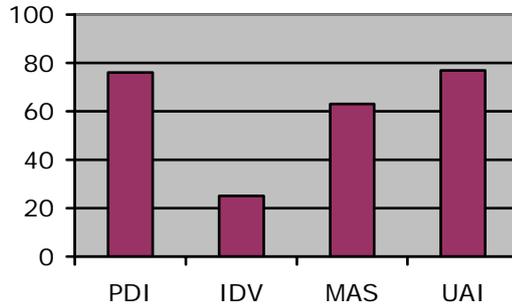
HOFSTEDE

PDI = 76

IDV = 25

MAS = 63

UAI = 77



LITERACY

LITERACY				Data Source 2002 survey	UNESCO Institute for Statistics (UIS)
Adult Literacy Rate (%)					
Total	Male	Female			
90.3	92.0	88.7			

LANGUAGE

Estados Unidos Mexicanos - Approximate Population 105M

Number of languages	298
Living languages	291
Extinct languages	7
Literacy rate	87% - 88%
Main language - Spanish	
Other languages -	
Arabic	400,000
English	350,000
Japanese	35,000
Chinese	31,000

ECONOMY

(Current US\$)	2000	2003	2004
GNI, Atlas method	501.1 billion	643.4 billion	703.1 billion
GNI per capita, Atlas method	5,110	6,290	6,770
GDP	581.4 billion	639.1 billion	676.5 billion
GDP growth (annual %)	6.6	1.4	4.4

Nigeria – Country Data Sheet

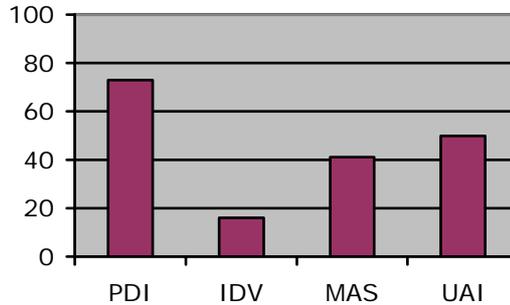
HOFSTEDE

PDI = 73

IDV = 16

MAS = 41

UAI = 50



LITERACY

LITERACY				Data Source	UNESCO
Adult Literacy Rate (%)				July 2002	Institute for
Total	Male	Female		Estimate	Statistics
66.8	74.4	59.4			(UIS)

LANGUAGE

Federal Republic of Nigeria – Approximate Population 137M

Number of languages	521
Living languages	510
Extinct languages	9
Literacy rate	42% to 51%

Main languages

Edo	English	Igbo	Hausa
Efik		Central Kanuri	Idoma
Adamawa	Fulfulde	Yoruba	

ECONOMY

(Current US\$)	2000	2003	2004
GNI, Atlas method	33.1 billion	47.6 billion	54.0 billion
GNI per capita, Atlas method (current US\$)	260.0	350.0	390.0
GDP (current \$)	42.1 billion	57.6 billion	72.1 billion
GDP growth (annual %)	4.2	10.7	3.6

S. Africa – Country Data Sheet

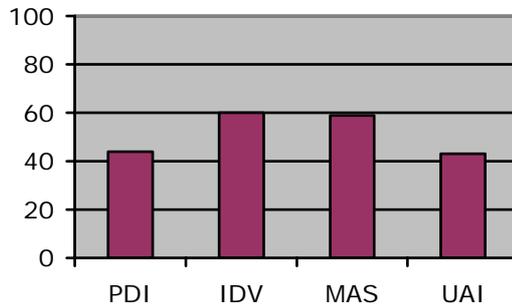
HOFSTEDE

PDI = 44

IDV = 60

MAS = 59

UAI = 43



LITERACY

Adult Literacy Rate (%)			Data Source	UNESCO
Total	Male	Female	C1996	Institute for Statistics (UIS)
82.4	84.1	80.9		

LANGUAGE

Republiek van Suid-Afrika - Approximate population 42.7M

Number of languages	31
Living languages	24
Extinct languages	4
Literacy rate	50% Africans, 62% 'Coloureds', 69% Asians, 99% Whites (1990 WA)

Main languages - Afrikaans, Ndebele, Northern Sotho, Southern Sotho, Swati, Tsonga, Tswana, Venda, Xhosa, Zulu, English

Portuguese	617,000
Tamil	250,000
Greek	70,000
Standard German	45,000

ECONOMY

(Current US\$)	2000	2003	2004
GNI, Atlas method	134.4 billion	130.7 billion	165.3 billion
GNI per capita, Atlas method (current US\$)	3,050.0	2,850.0	3,630.0
GDP (current \$)	132.9 billion	164.5 billion	212.8 billion
GDP growth (annual %)	4.2	2.8	3.7

Belgium – Country Data Sheet

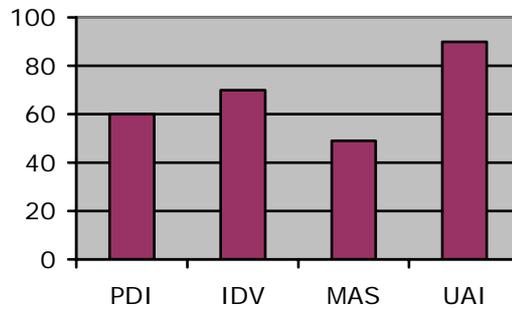
HOFSTEDE

PDI = 60

IDV = 70

MAS = 49

UAI = 90



LANGUAGE

Kingdom of Belgium Approximate population 10.3M

Number of languages	10
Living languages	9
Extinct languages	1
Literacy rate	98%

Main languages - Dutch, French, Standard German

Other languages -

Italian	280,000
Laz, Moroccan Spoken Arabic	105,000
Portuguese	80,000
Spanish	70,000
Turkish	63,600

ECONOMY

<i>(Current US\$)</i>	<i>2000</i>	<i>2003</i>	<i>2004</i>
GNI, Atlas method	255.1 billion	267.3 billion	322.8 billion
GNI per capita, Atlas method	24,890.00	25,760.00	31,030.00
GDP	228.3 billion	301.9 billion	349.8 billion
GDP growth (annual %)	3.8	1.1	2.9

France – Country Data Sheet

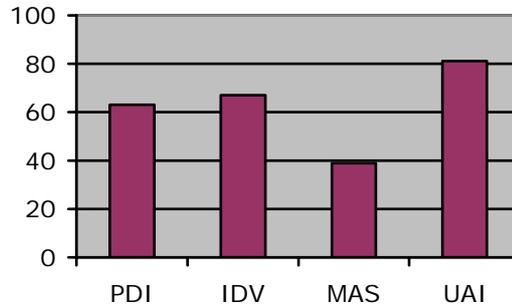
HOFSTEDE

PDI = 63

IDV = 67

MAS = 39

UAI = 81



LANGUAGE

République Française – Approximate population 60.4M

Number of languages	32
Living languages	29
Extinct languages	2
Literacy rate	99%
Main language - French	
Other languages -	
Algerian Spoken Arabic	660,000
Kabyle	537,000
Moroccan Spoken Arabic	492,700
Tunisian Spoken Arabic	212,900
Central Atlas Tamazight	150,000

ECONOMY

(Current US\$)	2000	2003	2004
GNI, Atlas method	1.5 trillion	1.5 trillion	1.9 trillion
GNI per capita, Atlas method	23,990.0	24,750.0	30,090.0
GDP	1.3 trillion	1.8 trillion	2.0 trillion
GDP growth (annual %)	3.8	0.5	2.3

UK – Country Data Sheet

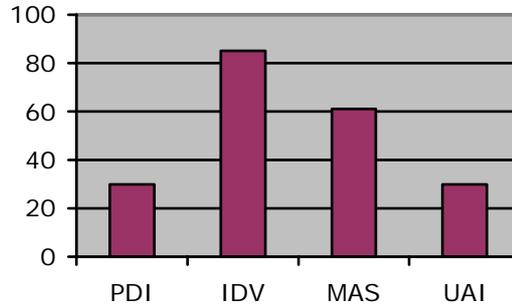
HOFSTEDE

PDI = 30

IDV = 85

MAS = 61

UAI = 30



LANGUAGE

United Kingdom (UK) - Approximate population 60.3M

Number of languages	18
Living languages	12
Extinct languages	4
Literacy rate	97% - 99%

Main languages - English, Welsh and French (regional)

Other languages -

Eastern Panjabi	471,000
Bengali	400,000
Urdu	400,000
Yue Chinese	300,000
Italian	200,000
Greek	200,000

ECONOMY

<i>(Current US\$)</i>	<i>2000</i>	<i>2003</i>	<i>2004</i>
GNI, Atlas method	1.5 trillion	1.7 trillion	2.0 trillion
GNI per capita, Atlas method	25,410.0	28,320.0	33,940.0
GDP	1.4 trillion	1.8 trillion	2.1 trillion
GDP growth (annual %)	3.8	2.2	3.1

USA – Country Data Sheet

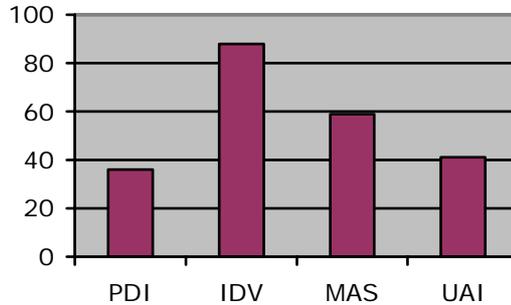
HOFSTEDE

PDI = 36

IDV = 88

MAS = 59

UAI = 41



LANGUAGE

United States of America (USA) – Approximate population 293M

Number of languages	238
Living languages	162
Extinct languages	73
Literacy rate	95% - 99%

Main languages - English (210M), Spanish (22.4M) and Hawaiian

Other languages -

German	6.1M
Polish	3.4M
Arabic	3.0M
Korean	1.8M
Chinese	1.64M
Czech	1.45M

ECONOMY

<i>(Current US\$)</i>	<i>2000</i>	<i>2003</i>	<i>2004</i>
GNI, Atlas method	9.7 trillion	11.0 trillion	12.2 trillion
GNI per capita, Atlas method	34,400.0	37,870.0	41,400.0
GDP	9.8 trillion	10.9 trillion	11.7 trillion
GDP growth (annual %)	3.7	3.1	4.4

SECTION 5.0

EXPERT SURVEY

This section provides the user with opinions of health and safety professionals, experienced in working in developing countries, on some of the issues outlined in previous sections

5.1 Expert Survey

In order to gain the opinions of construction professionals, with experience of working in developing countries, a questionnaire was constructed. The main section of the questionnaire consisted of twenty questions built around aspects highlighted in workshops conducted with members of the ECI SHE Task Force (language, local practices, skills, use of equipment, 'local' clients and workers' families).

The questionnaire was distributed by SHE Task Force members, used on site visits and in focus groups carried out by the research team. In total, 87 questionnaires were completed and in almost all cases the respondents had experience (on average 11 ½ years) as a Safety Manager / Supervisor.

The questions are listed on the following pages with graphical representation of the full responses and of the 'overall positive' and 'overall negative' responses.

Respondents were also asked to 'describe three initiatives that were successful in overcoming barriers to implementing health and safety in the particular country'. A summary of the responses to this question can be seen below.

INITIATIVES FOR OVERCOMING BARRIERS TO IMPLEMENTING HEALTH AND SAFETY

- | | |
|--|---|
| 1. Training / toolbox talks (27) | 6. Providing 'good' PPE (8) |
| 2. Safety promotion / incentive schemes (18) | 7. Behavioural safety programs (8) |
| 3. Choice of supervisor (12) | 8. Safety contests / awards (7) |
| 4. Site safety inductions (10) | 9. Understand and adopt local conditions (6) |
| 5. Regular safety meeting with workers (10) | 10. Include workers / unions in safety team (5) |

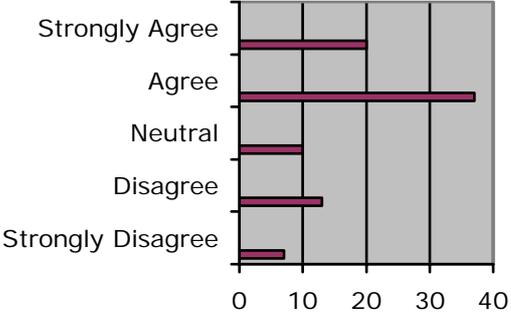
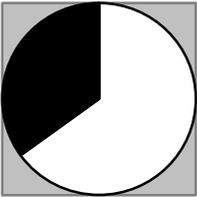
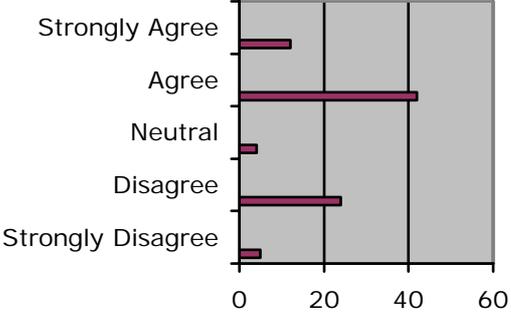
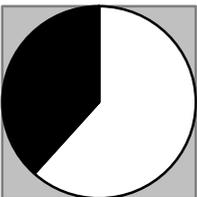
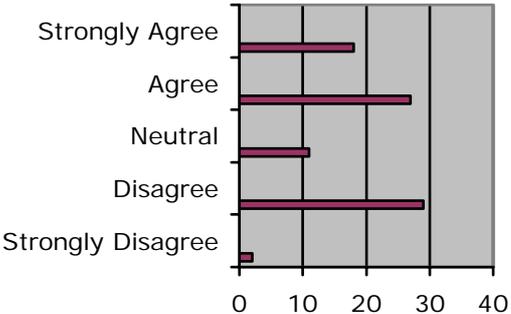
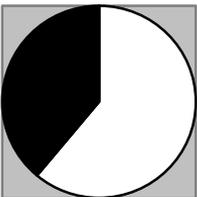
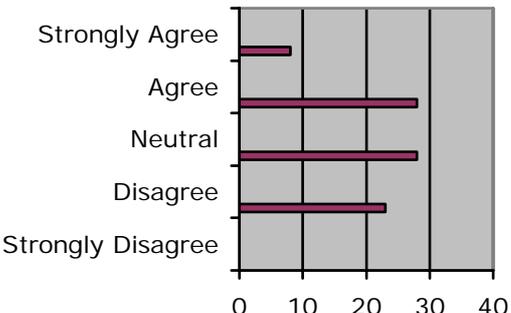
The respondents were asked to identify which countries they had worked in. These countries are listed below:

DEVELOPING COUNTRIES RESPONDENTS HAVE WORKED IN

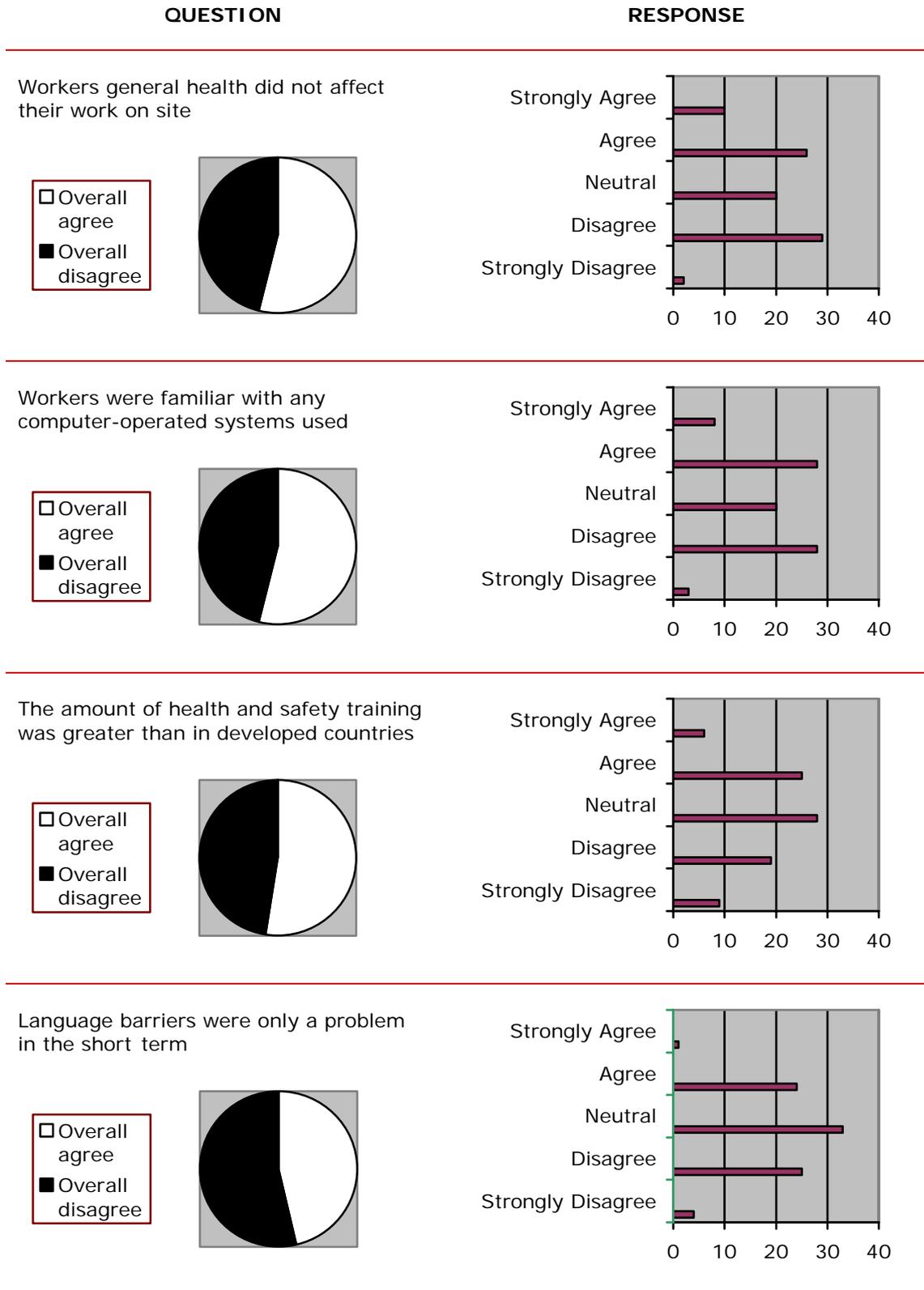
Algeria	Ivory Coast	Qatar
Argentina	Kazakhstan	Rhodesia
Azerbaijan	Kirkmanistan	Russia
Bahrain	Kuwait	Sarawak
Botswana	Lebanon	Saudi Arabia
Brunei	Lesotho	Singapore
China	Libya	South Africa
Egypt	Malaysia	Sri Lanka
Georgia	Malawi	Taiwan
Ghana	Mozambique	Thailand
Hong Kong	Nigeria	Trinidad and Tobago
India	Oman	Tunisia
Indonesia	Pakistan	Turkey
Iran	Philippines	United Arab Emirates
Iraq	Poland	Yemen

NOTE: not all of the countries shown are classified as developing countries. However, countries such as Qatar and Hong Kong are small in size and rely heavily on migrant workers. The migrant workers will usually come from developing countries and bring with them the work practices, cultural and language differences that were of interest to the project.

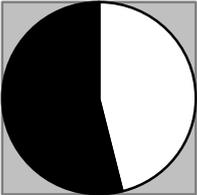
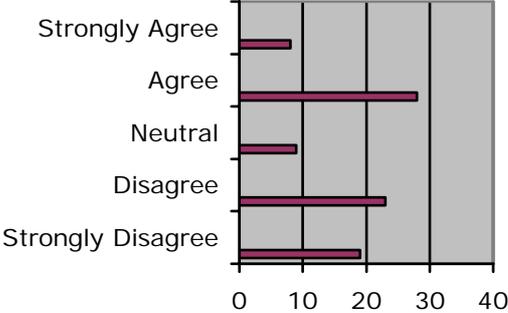
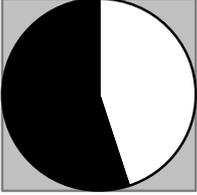
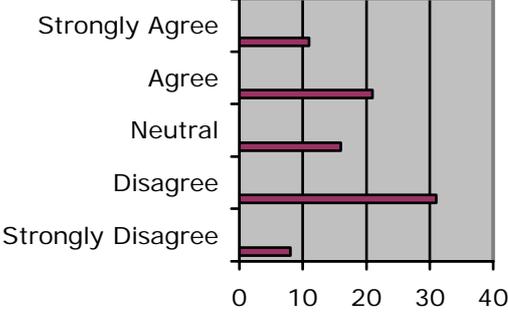
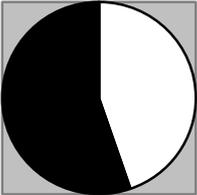
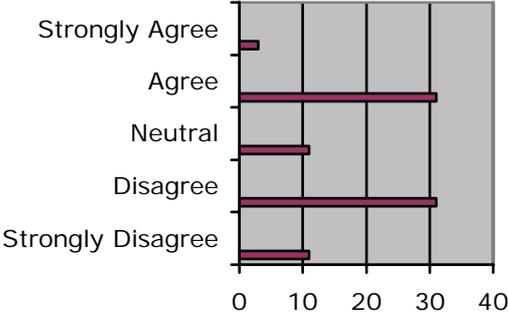
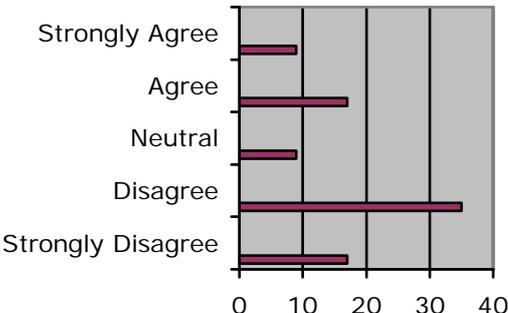
5.2 Questionnaire Results

QUESTION	RESPONSE												
<p>The client was not supportive of health and safety initiatives</p> <div data-bbox="220 607 368 745" style="border: 1px solid red; padding: 5px; display: inline-block;"> <p>□ Overall agree</p> <p>■ Overall disagree</p> </div> 	 <table border="1"> <thead> <tr> <th>Response</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Strongly Agree</td> <td>0</td> </tr> <tr> <td>Agree</td> <td>38</td> </tr> <tr> <td>Neutral</td> <td>10</td> </tr> <tr> <td>Disagree</td> <td>12</td> </tr> <tr> <td>Strongly Disagree</td> <td>5</td> </tr> </tbody> </table>	Response	Percentage	Strongly Agree	0	Agree	38	Neutral	10	Disagree	12	Strongly Disagree	5
Response	Percentage												
Strongly Agree	0												
Agree	38												
Neutral	10												
Disagree	12												
Strongly Disagree	5												
<p>Equipment normally used in developed countries was not available</p> <div data-bbox="220 992 368 1131" style="border: 1px solid red; padding: 5px; display: inline-block;"> <p>□ Overall agree</p> <p>■ Overall disagree</p> </div> 	 <table border="1"> <thead> <tr> <th>Response</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Strongly Agree</td> <td>10</td> </tr> <tr> <td>Agree</td> <td>40</td> </tr> <tr> <td>Neutral</td> <td>5</td> </tr> <tr> <td>Disagree</td> <td>20</td> </tr> <tr> <td>Strongly Disagree</td> <td>5</td> </tr> </tbody> </table>	Response	Percentage	Strongly Agree	10	Agree	40	Neutral	5	Disagree	20	Strongly Disagree	5
Response	Percentage												
Strongly Agree	10												
Agree	40												
Neutral	5												
Disagree	20												
Strongly Disagree	5												
<p>Skill levels of workers did not affect health and safety</p> <div data-bbox="220 1373 368 1512" style="border: 1px solid red; padding: 5px; display: inline-block;"> <p>□ Overall agree</p> <p>■ Overall disagree</p> </div> 	 <table border="1"> <thead> <tr> <th>Response</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Strongly Agree</td> <td>18</td> </tr> <tr> <td>Agree</td> <td>28</td> </tr> <tr> <td>Neutral</td> <td>12</td> </tr> <tr> <td>Disagree</td> <td>30</td> </tr> <tr> <td>Strongly Disagree</td> <td>5</td> </tr> </tbody> </table>	Response	Percentage	Strongly Agree	18	Agree	28	Neutral	12	Disagree	30	Strongly Disagree	5
Response	Percentage												
Strongly Agree	18												
Agree	28												
Neutral	12												
Disagree	30												
Strongly Disagree	5												
<p>Traditional / local methods of work were not found to pose any health and safety problems</p> <div data-bbox="220 1787 368 1926" style="border: 1px solid red; padding: 5px; display: inline-block;"> <p>□ Overall agree</p> <p>■ Overall disagree</p> </div> 	 <table border="1"> <thead> <tr> <th>Response</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Strongly Agree</td> <td>8</td> </tr> <tr> <td>Agree</td> <td>28</td> </tr> <tr> <td>Neutral</td> <td>28</td> </tr> <tr> <td>Disagree</td> <td>22</td> </tr> <tr> <td>Strongly Disagree</td> <td>0</td> </tr> </tbody> </table>	Response	Percentage	Strongly Agree	8	Agree	28	Neutral	28	Disagree	22	Strongly Disagree	0
Response	Percentage												
Strongly Agree	8												
Agree	28												
Neutral	28												
Disagree	22												
Strongly Disagree	0												

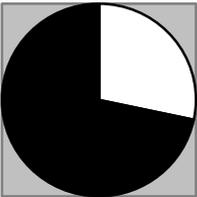
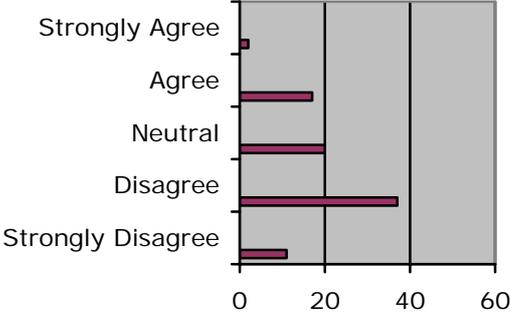
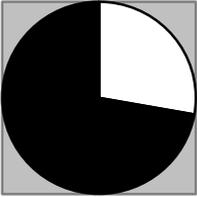
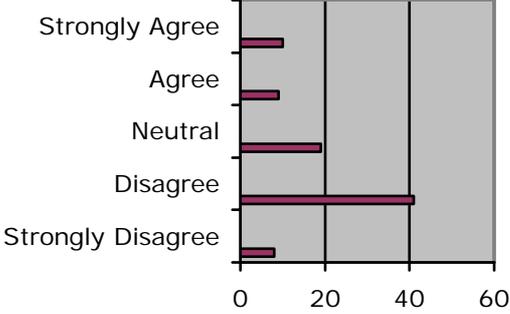
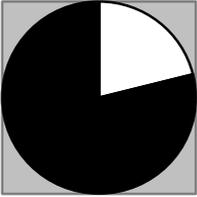
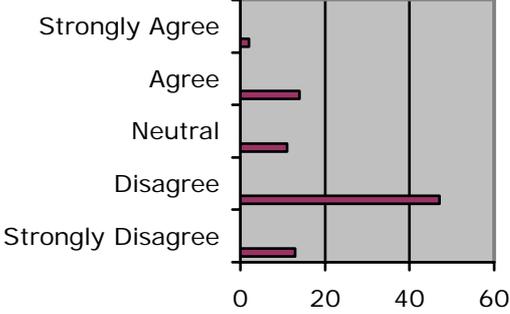
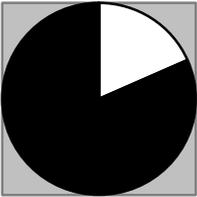
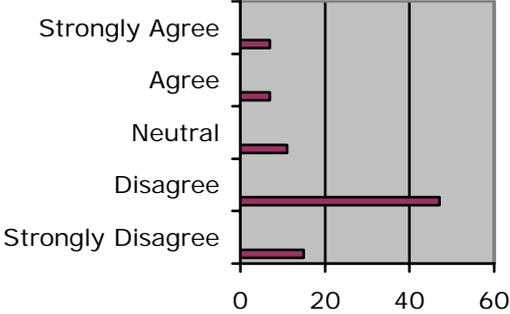
5.2 Questionnaire Results



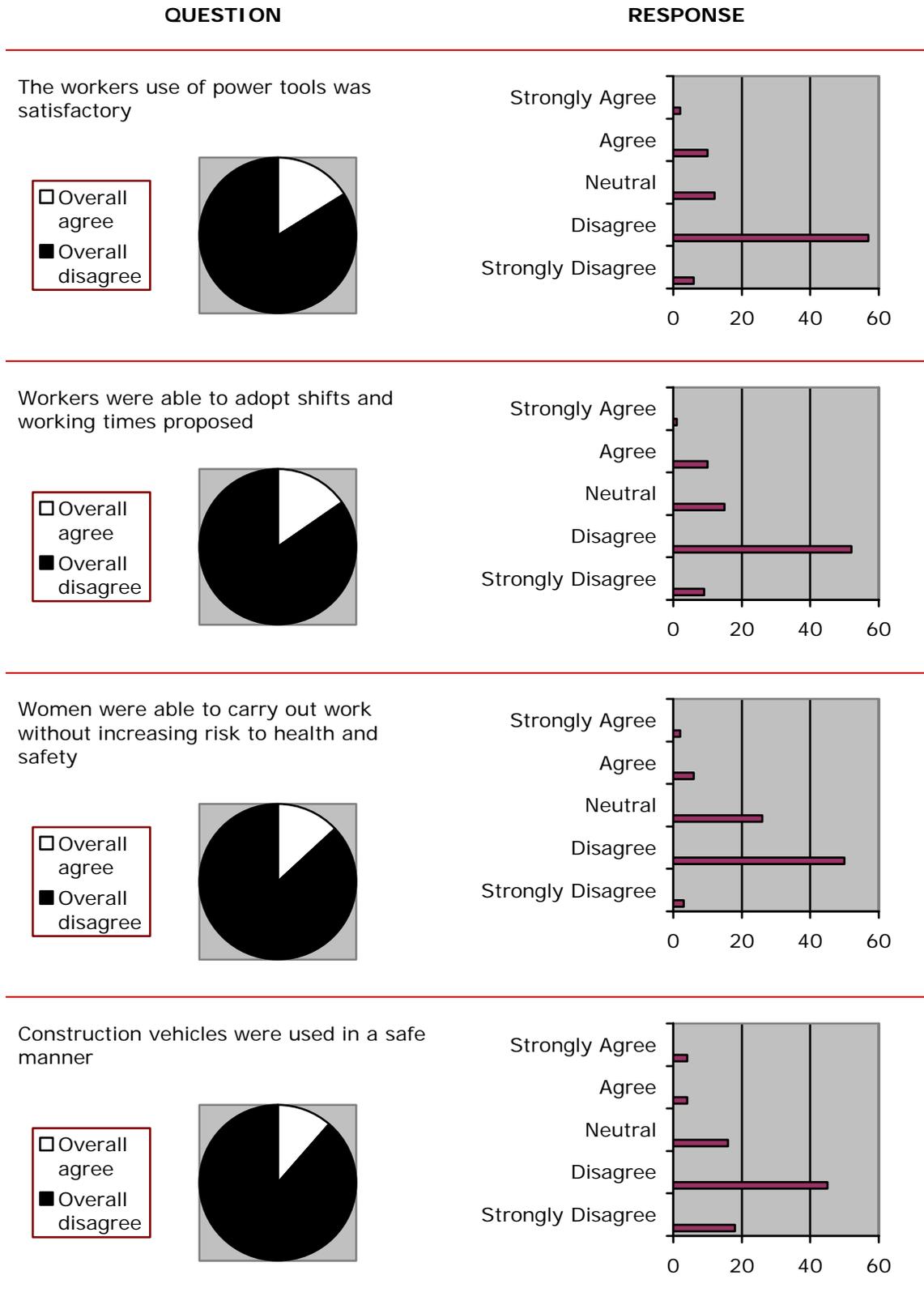
5.2 Questionnaire Results

QUESTION	RESPONSE												
<p>Working at height was carried out using local practices</p> <div data-bbox="220 607 368 741" style="border: 1px solid red; padding: 5px; display: inline-block;"> <p>□ Overall agree</p> <p>■ Overall disagree</p> </div> 	 <table border="1"> <thead> <tr> <th>Response</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>Strongly Agree</td> <td>8</td> </tr> <tr> <td>Agree</td> <td>28</td> </tr> <tr> <td>Neutral</td> <td>8</td> </tr> <tr> <td>Disagree</td> <td>22</td> </tr> <tr> <td>Strongly Disagree</td> <td>18</td> </tr> </tbody> </table>	Response	Count	Strongly Agree	8	Agree	28	Neutral	8	Disagree	22	Strongly Disagree	18
Response	Count												
Strongly Agree	8												
Agree	28												
Neutral	8												
Disagree	22												
Strongly Disagree	18												
<p>Workers perception of risk was the same as in developed countries</p> <div data-bbox="220 994 368 1128" style="border: 1px solid red; padding: 5px; display: inline-block;"> <p>□ Overall agree</p> <p>■ Overall disagree</p> </div> 	 <table border="1"> <thead> <tr> <th>Response</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>Strongly Agree</td> <td>10</td> </tr> <tr> <td>Agree</td> <td>20</td> </tr> <tr> <td>Neutral</td> <td>15</td> </tr> <tr> <td>Disagree</td> <td>30</td> </tr> <tr> <td>Strongly Disagree</td> <td>5</td> </tr> </tbody> </table>	Response	Count	Strongly Agree	10	Agree	20	Neutral	15	Disagree	30	Strongly Disagree	5
Response	Count												
Strongly Agree	10												
Agree	20												
Neutral	15												
Disagree	30												
Strongly Disagree	5												
<p>The amount of manual handling was greater than that in developed countries</p> <div data-bbox="220 1375 368 1509" style="border: 1px solid red; padding: 5px; display: inline-block;"> <p>□ Overall agree</p> <p>■ Overall disagree</p> </div> 	 <table border="1"> <thead> <tr> <th>Response</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>Strongly Agree</td> <td>2</td> </tr> <tr> <td>Agree</td> <td>30</td> </tr> <tr> <td>Neutral</td> <td>10</td> </tr> <tr> <td>Disagree</td> <td>30</td> </tr> <tr> <td>Strongly Disagree</td> <td>10</td> </tr> </tbody> </table>	Response	Count	Strongly Agree	2	Agree	30	Neutral	10	Disagree	30	Strongly Disagree	10
Response	Count												
Strongly Agree	2												
Agree	30												
Neutral	10												
Disagree	30												
Strongly Disagree	10												
<p>Health and safety priorities were the same as for those on projects in developed countries</p> <div data-bbox="220 1783 368 1917" style="border: 1px solid red; padding: 5px; display: inline-block;"> <p>□ Overall agree</p> <p>■ Overall disagree</p> </div> 	 <table border="1"> <thead> <tr> <th>Response</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>Strongly Agree</td> <td>8</td> </tr> <tr> <td>Agree</td> <td>15</td> </tr> <tr> <td>Neutral</td> <td>8</td> </tr> <tr> <td>Disagree</td> <td>35</td> </tr> <tr> <td>Strongly Disagree</td> <td>15</td> </tr> </tbody> </table>	Response	Count	Strongly Agree	8	Agree	15	Neutral	8	Disagree	35	Strongly Disagree	15
Response	Count												
Strongly Agree	8												
Agree	15												
Neutral	8												
Disagree	35												
Strongly Disagree	15												

5.2 Questionnaire Results

QUESTION	RESPONSE												
<p>Workers' families have a greater influence on how they work than in developed countries</p> <div data-bbox="220 638 368 775"> <p>Overall agree</p> <p>Overall disagree</p> </div> 	 <table border="1"> <thead> <tr> <th>Response</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Strongly Agree</td> <td>2</td> </tr> <tr> <td>Agree</td> <td>18</td> </tr> <tr> <td>Neutral</td> <td>20</td> </tr> <tr> <td>Disagree</td> <td>38</td> </tr> <tr> <td>Strongly Disagree</td> <td>12</td> </tr> </tbody> </table>	Response	Percentage	Strongly Agree	2	Agree	18	Neutral	20	Disagree	38	Strongly Disagree	12
Response	Percentage												
Strongly Agree	2												
Agree	18												
Neutral	20												
Disagree	38												
Strongly Disagree	12												
<p>National and regional health and safety regulations were enforced by the authorities</p> <div data-bbox="220 1050 368 1187"> <p>Overall agree</p> <p>Overall disagree</p> </div> 	 <table border="1"> <thead> <tr> <th>Response</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Strongly Agree</td> <td>12</td> </tr> <tr> <td>Agree</td> <td>10</td> </tr> <tr> <td>Neutral</td> <td>20</td> </tr> <tr> <td>Disagree</td> <td>42</td> </tr> <tr> <td>Strongly Disagree</td> <td>16</td> </tr> </tbody> </table>	Response	Percentage	Strongly Agree	12	Agree	10	Neutral	20	Disagree	42	Strongly Disagree	16
Response	Percentage												
Strongly Agree	12												
Agree	10												
Neutral	20												
Disagree	42												
Strongly Disagree	16												
<p>Workers were able to provide the standard of electrical work required</p> <div data-bbox="220 1422 368 1559"> <p>Overall agree</p> <p>Overall disagree</p> </div> 	 <table border="1"> <thead> <tr> <th>Response</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Strongly Agree</td> <td>2</td> </tr> <tr> <td>Agree</td> <td>15</td> </tr> <tr> <td>Neutral</td> <td>12</td> </tr> <tr> <td>Disagree</td> <td>48</td> </tr> <tr> <td>Strongly Disagree</td> <td>23</td> </tr> </tbody> </table>	Response	Percentage	Strongly Agree	2	Agree	15	Neutral	12	Disagree	48	Strongly Disagree	23
Response	Percentage												
Strongly Agree	2												
Agree	15												
Neutral	12												
Disagree	48												
Strongly Disagree	23												
<p>Lifting operations were carried out the same as in developed countries</p> <div data-bbox="220 1805 368 1942"> <p>Overall agree</p> <p>Overall disagree</p> </div> 	 <table border="1"> <thead> <tr> <th>Response</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Strongly Agree</td> <td>8</td> </tr> <tr> <td>Agree</td> <td>8</td> </tr> <tr> <td>Neutral</td> <td>12</td> </tr> <tr> <td>Disagree</td> <td>48</td> </tr> <tr> <td>Strongly Disagree</td> <td>24</td> </tr> </tbody> </table>	Response	Percentage	Strongly Agree	8	Agree	8	Neutral	12	Disagree	48	Strongly Disagree	24
Response	Percentage												
Strongly Agree	8												
Agree	8												
Neutral	12												
Disagree	48												
Strongly Disagree	24												

5.2 Questionnaire Results



SECTION 6.0

FURTHER INFORMATION

This section provides tools to further knowledge of the areas of concern when working in developing countries

6.1 Recommended Reading

TITLE	AUTHOR	PUBLISHER
Kiss, bow, or shake hands	Terri Morrison, Wayne A. Conaway and George A. Borden	Adams Media Corporation Avon Massachusetts
Bodyspace	Stephen Pheasant	Taylor & Francis, London

6.2 Useful Websites

Culture	http://www.geert-hofstede.com
Economy	http://www.worldbank.org
Language	http://www.ethnologue.com
Literacy	http://portal.unesco.org/education/en/

6.3 Photograph Credits

– *Main Issues (section 2.0)*

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Women Construction Workers, Bangalore	K.L.Kamat / www.kamat.com
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Women Working On Construction Site, Vietnam	www.Saigonsoldier.com

6.3 Photograph Credits

– *Cameos & Notes (section 3.0)*

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Ramp access to work on shuttering	Shaw Stone & Webster Ltd
Fall arrest system for roofing work	Shaw Stone & Webster Ltd
Steel fabricated baskets to hang off girders	Shaw Stone & Webster Ltd
Worker in basket attached to crane	© Loughborough University
Small steel basket to support worker	© Loughborough University
Woman construction worker, Bangalore	K.L.Kamat / www.kamat.com
Women construction workers, Jamnagar	© Loughborough University
Worker wearing welding mask	Shaw Stone & Webster Ltd
Safety glasses worn under mask	Shaw Stone & Webster Ltd
Construction workers travelling to work	© Loughborough University
Overloaded barge	www.Saigonsoldier.com
Lorry in desert carrying mattresses	© photobiker.com

6.4 References

- Ahmad I. Azhar S. and Ahmed S.M. 2000. Constructing Infrastructure Facilities in Developing Countries: A Bangladesh Case Study in Proceedings of the 2nd International Conference on Construction in Developing Countries, Botswana, Nov 2000
- Alwi S. Hampson K. and Mohaned S. Waste in the Indonesian Construction Projects. in Proceedings of the 2nd International Conference on Construction in Developing Countries, Botswana, Nov 2000
- Ashby P. 1979, Ergonomics Handbook 1: Body Size and Strength, SA Design Institute, Pretoria
- Awan T. 2002. Occupational Health and Safety in Pakistan. Pakistan Institute of Labour Education and Research (PILER). <http://www.amrc.org.hk/alu/Alu39/013902.html>
- Barecz P. 2001. Passing the Buck on Workplace Safety. In the Slovak Spectator, 7, No 20, May 21-27, 2001
- Blacknet 2005. <http://www.blacknet.co.uk/homeland/nigeria.htm>
- English J. 2000. Opportunities for Training and Self Development that the New Millennium Offers the Informal Construction Worker in South Africa: A Case Study of 200 Workers. In Proceedings Of The 2nd International Conference On Construction In Developing Countries, Botswana, Nov 2000
- Fagbenle O.I. Adeyemi A.Y. and Adesanya D. A. 2004. The Impact of Non- Financial Incentives on Bricklayers' Productivity in Nigeria. In Construction Management and Economics (Spon Press). 22, 899-911
- Fang D.P. Zhang J. and Vickridge I. 2003. Construction Safety Legislation Framework in China. In Municipal Engineer: Proceedings of the Institution of Civil Engineers. 156, 169-173
- Flory M. 2001. Solving the Language Barrier. In Occupational Health & Safety (Waco). 70, 37-38
- Forbes L. H. Ahmed S. M. and Barcala M. 2002. Adapting Lean Construction Theory for Practical Application in Developing Countries. In Proceedings of the 2nd International Conference on Construction In Developing Countries, Botswana, Nov 2000
- Hong Kong Polytechnic 2005. Bamboo Scaffolding Guidelines
- Hutchinson K. 2001. Research Stations Still Under Construction. http://www.polar.org/antsun/oldissues2001-2002/2001_1104/construction.html
- Idoro G. I. 2004. The Effect Of Globalization on Safety in the Construction Industry in Nigeria. In Proceedings of the International Conference on Globalization and Construction: Meeting the Challenges and Reaping the Benefits Bangkok, Nov 2004
- International Labour Organisation. 1998. China: Promoting Safety and Health in Township and Village Enterprises. From the International Labour Organisation's Asian-Pacific Regional Network on Occupational Safety and Health Information (ASIA-OSH)
- International Labour Organisation. 2005. Health and Safety. <http://www.ilo.org/public/english/dialogue/sector/sectors/constr/health.htm>
- Juengprasert W. 2004. Editorial. Asian-Pacific Newsletter on Occupational Health and Safety, (Finnish Institute of Occupational Safety and Health), 11 Mar 2004

- Kalaro N. 2004. Breaching The Language Barrier. In Occupational Health and Safety, (Waco), 73, 60-64
- Kartam N. A. Flood, I. Koushki P. 2000. Construction Safety in Kuwait: Issues, Procedures, Problems, and Recommendations. In Safety Science (Permagon) 36, 163-184
- Keskonis P. and Siddiqi K. M. 2000. Empowering Workforce to Achieve their Maximum Potential. In Proceedings of the 2nd International Conference on Construction in Developing Countries, Botswana, Nov 2000
- Khazanet V. L. 2002. Construction practices in the Former Soviet States. In Cost Engineering (Morgantown) 44, 18-28
- Koehn E. Ahmed S. A. Jayanti S. 2000. Variation in Construction Productivity: Developing Countries. *AACE International Transactions*. (Morgantown) Pg. 14A, 7 Pgs
- Laroche L. 1998. Managing Cross-Cultural Differences in International Projects. In Engineering Dimensions: Magazine of the Association of Professional Engineers of Ontario. Nov/Dec 1998
- Lubega H. Kiggundu B. M. and Tindiwensi D. 2004. An Investigation into the Causes of Accidents in the Construction Industry in Uganda. In Proceedings of the International Conference on Globalisation and Construction: Meeting the Challenges and Reaping the Benefits Bangkok, Nov 2004
- Materu S. 2002. Towards Sustainable Local Contracting Capacity – CRB Approach. In Challenges Facing the Construction Industry in Developing Countries, South Africa, Nov 2002
- Mbuya E. and Lema N. M. Towards Development of a Framework for Integration of Safety and Quality Management Techniques in Construction Project Delivery Process. In proceedings of the 2nd International Conference on Construction in Developing Countries, Botswana, Nov 2000
- Mselle P. C. and Kgaube T. 2000. Impact of Migrant Labour on the Local Construction Industry: A Case of Botswana. In Proceedings of the 2nd International Conference on Construction in Developing Countries, Botswana, Nov 2000
- Muhegi B. Malongo J. 2004. Globalization: A Challenge to the Tanzanian Construction Industry. In Proceedings of the International Conference on Globalization and Construction: Meeting the Challenges and Reaping the Benefits Bangkok, Nov 2004
- Mususa P. N. and Wood B. 2004. The Creating of a Sustainable Building Industry in the Housing Sector of Lusaka, Zambia. In Proceedings of the 2nd International Conference on Construction in Developing Countries, Botswana, Nov 2000
- Peckitt S. J. Glendon A. I. and Booth R. T. 2004, "Societal Influences on Safety Culture in the Construction Industry", Implementation of Safety and Health on Construction Sites; Construction Safety Management Systems, ed. S. M. Rowlinson, London, Spon, 2004, pp.17
- Priya S. K. 2000. Violence Against Women Construction Workers in Kerala, India. The Ralph Bunche Institute on the United Nations
- Ryan-Collins L. 2002. <http://www.iaeste.ee/eng/index.htm>
- Sanders M. S. and McCormick E. J. 1992, Human Factors in Engineering and Design, Seventh edition, McGraw-Hill, New York
- Serpell A. De Solminihaç H. and Figari C. 2002. A General Diagnosis of Construction Quality in Chile. In Challenges Facing the Construction Industry in Developing Countries, South Africa, Nov 2002

- SEWA. 2005. Impact of Globalization on Various Sectors Related to Informal Economy (Gist of the findings made in various papers by SEWA)
- Situmbeko S. M. Kanyemba J. 2000. Technologies and Designs for Cost Effective Housing. In Proceedings of the 2nd International Conference on Construction in Developing Countries, Botswana, Nov 2000
- Ssegawa J. K. 2004. A Strategic Planning in Small and Medium Construction Firms. In Proceedings of the International Conference on Globalization and Construction: Meeting the Challenges and Reaping the Benefits Bangkok, Nov 2004
- Stewart R. A. and Jiang Z. 2004. China's Construction Industry After WTO Accession: Opportunities, Challenges and Strategies. In Proceedings of the International Conference on Globalisation and Construction: Meeting the Challenges and Reaping the Benefits Bangkok, Nov 2004
- Takala J. 1982. Occupational Accidents in Developing Countries. In Journal of Occupational Accidents, (Elsevier, Netherlands), 4, 361-369
- Tam C. M. Zeng S. X. Deng Z. M. 2004. Identifying Elements of Poor Construction Safety Management in China. In Safety Science, (Elsevier), 42, 569-586
- Wallerstein N. 1992. Health and Safety Education for Workers with Low-Literacy or Limited-English Skills. In American Journal of Industrial Medicine, (CSA Illumina) 22, 751-765
- Weddikkara C. and Devapriya K. 2002. The Sri-Lankan Construction Industry in the New Millennium. In Challenges Facing the Construction Industry in Developing Countries, South Africa, Nov 2002
- Wells J. 2000. The Construction Industry in Low Income Countries: An Agenda for Research
- Yoopat P. 2004. Reducing Physiological Strain in Construction Work in Thailand – An Ergonomic Method. In Asian-Pacific Newsletter on Occupational Health and Safety, (Finnish Institute of Occupational Health), 11, 15-17
- Zawdie G. Langford D. A. 2000. The State Of Construction and Infrastructure in Sub-Saharan Africa and Strategies for a Sustainable Way Forward. In Proceedings of the 2nd International Conference on Construction in Developing Countries, Botswana, Nov 2000



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