

# **A Strategic Approach to Bridging the Gap Between Global Digital Construction and the Low-Tech Third World: An Overview**

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## **Abstract**

The rapid advancement in the usage of information and communication technology (ICT) has – *inter-alia* – led to a more integrated and interconnected business world. A key driver of this phenomenon has been the increasing demand for business information so that firms can outbid competitors in global-based business maneuvers. Even though construction may lag in terms of uptake of technology, there has been an increase in the proliferation and application of assorted ICT in global construction activities – *except the third world nations*. As a result, construction business in most countries face severe competitive disadvantage from international firms that are highly mechanised, and use world class standard ICT tools in their business operations. Such is the case for most construction related businesses in the architecture, engineering, construction and facilities management (AEC/FM) industry in Zambia. A recent pilot survey indicated that local firms were out-bid on most projects that international firms were allowed to bid for. There are many factors causing this scenario, of which underutilization of ICT is one. This research highlights the general severity of the digital divide that exists between the low-tech third world and the developed world – *with special reference to construction business in Zambia* – and the best strategies to use so that the problem could be reduced.

## **Keywords**

AEC/FM Zambia, Competitiveness, Digital Divide in Construction, ICT

## **1. Introduction**

Advances in information and communication technologies (ICT) have ushered greater efficiency and economic benefits to the industrial world. The construction industry is a beneficiary of technological advances, more so in the developed world where ICT has been embraced to a large extent. On the other hand, third world construction has been losing out on many jobs due to poor uptake of basic technology. In most cases business proprietors attribute their poor regional and international competitiveness to inadequate government protection, and weak regulatory measures that can wade off

global competition (NCC, 2003). However, even though legal protection could be a vital factor in itself, it should not be a panacea for endemic uncompetitive business practices in the Third-world AEC/FM industry. As a result construction business in Zambia, has always been challenged to innovative, and change with time if it is to effectively participate in the regional and international projects around Southern Africa (Business Reporter, 2003). Low uptake of ICT, and the general labour intensive approach to construction business have been contributing factors to this problem. This research highlights the general severity of the digital divide that exists between the low-tech third world and the developed world – *with special reference to construction business in Zambia* – and the best strategies to use so that the problem could be reduced.

## **1.0 ICT in Construction Business in Zambia: Trends in the 1990s and Beyond**

The uptake of ICT in construction business has not been good (Gondwe, 1999). Generally, Zambia has been one of the developing nations that have been bypassed by the benefits accruing from the use of ICT. The digital gap permeates the private and public sector alike (Zambia Daily Mail, 2005). There are many factors that have caused such a scenario. However before citing them, it is prudent to define digital divide in construction.

### **1.1 Defining Digital Divide in Construction Business**

This mainly has to do with the gap between the availability of ICT, mechanisation tools on the market, and the affordability of such products by construction businesses. It also has to do with the economic sense of acquisition, either by hiring or owning, or both, of the products necessary to leverage one's business position in the industry. The other factor covers the pervasive nature of such products amongst industry actors, in comparison to the case world-wide. Such products include, software, hardware, and mechanical equipment, training facilities, health and safety gear, and easy accessibility to internet resources (of international standard), such as cost data and economic data.

### **1.2 Factors Causing Digital Divide in Third-World Construction Business**

Some of the factors that are causing digital divide are:

- Lack of infrastructure such as telephone lines, bandwidth of internet connections, energy supply, transportation networks (road, rail and sea), legal framework governing business;
- Limitations in borrowing capacity from banks;
- High interest rates, intermittent flow of projects, donor conditions attached to projects (e.g. employing consultants of the same origin as the donor), and political attachments to projects;
- High cost of vendor tailored computer systems, and other factors.
- Lack of investment in plant, equipment, training and staff development (NCC, 2003).

### **1.3 The Impact of Digital Divide in the Zambian Construction Industry**

The most notable impact of digital divide is the loss of jobs to foreign contractors and consultants (Business Reporter, 2003). For instance, the range of technical expertise required for a complex project such as Kafue Lower Gorge [*estimated at US\$600m to US\$750m*] and Itezhi-Itzhi dam [*estimated at US\$100 to 150m*] is varied. However, almost seventy percent (70%) of the consultants working on them are international firms (Business Reporter, 2003). Therefore, the overall impact of this ICT divide is mainly economic loss to local businesses, and the nation at large.

## **2.0 World Construction Business and the ICT Usage: a Lesson for Low-Tech Industries**

In the international construction industry there is increasing evidence of the integration of Information and Communication Technology (ICT) applications into business processes (Shakantu et al, 2002). There has been an upswing in the usage of ICT in construction business in most developed construction, especially in CAD Modeling, information management, E-tendering, to mention but a few (Pandawe, 2004). There is now an issue of integrating various systems and software to create a coherent whole – *here called interoperability*. Though more could be done, business has been the key driver to automation in construction. Other factors include R&D, increasing competition, transparency, and global business trends.

### 3.0 Research Design and Data Collection

The professionals that participated in the research are tabulated in Table 1. There was no key criterion for sampling respondents because the number of registered professionals within the built environment is limited. Therefore questionnaires were available to every registered professional. Those that participated in the research formed a sample of the general population obtainable from registration authorities, such as the National Council for Construction. The generic nature of the respondents was that they were reluctant to share their own misfortunes in the ICT circles of their business. Additionally, geographical dispersion was such that they are *dotted countrywide at greater distances* between each other. Therefore, it was prudent to use a questionnaire as a data collection tool (Kumar, 1999), and an interview to validate research results. Because of the limited number of professionals within the built environment business in Zambia, an overall response rate of 62% was representative enough to warrant data analysis, and develop conclusions.

Respondent Category	Sample (n)	Response
<b>Training Institutions</b>	<b>10</b>	<b>3</b>
<b>Engineers</b>	<b>10</b>	<b>5</b>
<b>Building Suppliers</b>	<b>11</b>	<b>7</b>
<b>Local Contractors</b>	<b>23</b>	<b>13</b>
<b>Quantity Surveyors</b>	<b>8</b>	<b>4</b>
<b>Architects</b>	<b>21</b>	<b>13</b>
<b>Co-operate Organisations</b>	<b>3</b>	<b>3</b>
Totals	77	48

**Table 1:** Category of Respondents and the Response Rate [Source: Authors, 2005]

### 4.0 Data Presentation and Analysis

Data presentation and analysis in this research paper is extremely brief because of the general limitation on the length of the paper. Thus far, the research has highlighted the general severity of the digital divide that exists between the low-tech third world and the developed world. To develop the best strategies for reducing the digital divide, there is a need for creating a theory and understanding based on the results from respondents. This research was designed to tackle the problem from two angles, that is, general training and industrial practice. Meaning, that there was an assumption that *'if built environment business training, and professional practice embraced ICT, there could be a genuine reduction in the digital divide'*. Therefore, data presentation and analysis for this research falls under the categories of training and practice as shown below.

1.

#### 4.1 Training

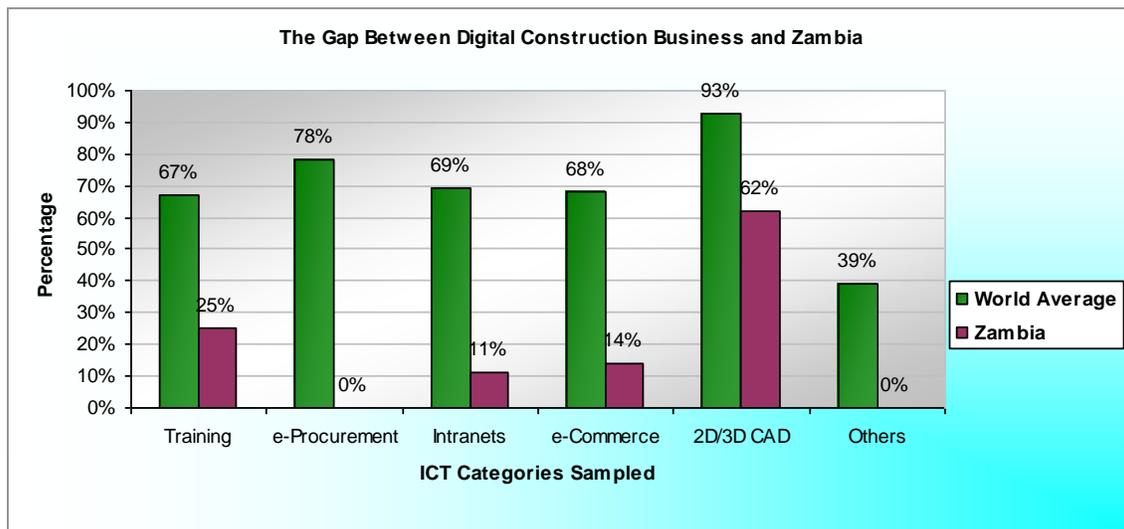
The data collected on the training programs that, among other things, covered ICT usage were looked at in the following way:

- Testing the appreciation that there could be a link between economic development and skills upgrading. Seventy five percent (75 %) of the respondents agreed to this notion;
- To this effect, ninety three percent (93%) of the respondents felt they did not receive world-class training, as far as ICT training was concerned. The following factors were cited as the major contributor:
  - Lack of facilities, and high cost of ICT training;
  - General set up of industry – which is traditional at best, and other reasons.
- To test public expenditure received towards the enforcement of ICT in the training of construction professionals. There was no policy from either sector.

## 4.2 Practice

Concerning practice, the research tested the application of various hardware and software systems in general construction related business. The following were the broad categories:

- The use of e-procurement, e-conferences or e-meetings is not in practice in the construction industry, to a large extent. This is shown in Chart 1 because:
  - Industrial setup supports sequential approach to project procurement;
  - Lack of capital to invest in automated systems, and other reasons.
- Intranets not in use, except for twenty percent (20%) of respondents; mainly due to lack of knowledge on the concept of intranets;
- Email usage was at eighty percent (80%), but the cost of connecting and rental was the impeding factor;
- Electronic collaboration, such as project web-pages, and so fourth – totally non –existent;
- General update of ICT tools and systems are rudimental. Chart 1 articulates the differences between construction business in the industrial world, by 1996, and that of Zambia in 2005. The disparity is extremely high;
- Testing the perception that failure to invest in ICT could have a negative impact on their businesses; hence affect their profitability. Eighty two percent (82%) agreed with this reasoning, especially that they have been out-bid by global players, on world class jobs such as electricity generating schemes, highways, and large infrastructure projects (Business Reporter, 2003).



**Chart 1:** The Gap between Digital Construction Business and Zambia [Source: Pandawe, 2003]

## 5.0 Conclusion and Recommendations

Despite the increase in the uptake of ICT tools in construction business, Third world construction businesses have maintained rudimental operations. This is because of the failure to invest in research and development, failure to invest in people training, and lack of capital to invest in ICT systems. The impact is such that global construction businesses outbid their local rivals on vital projects such as electricity generation schemes. However, this is to be expected. Strategically then, we recommend that, firstly, training institutions embrace ICT. Secondly, each local government could plausibly initiate targeted joint ventures between international firms and that of local firms. This would not only encourage skills transfer in ICT and other skills, but also ensure that local firms could access data on possible alliances each time there is a major project. This recommendation is economically beneficial to both local and international firms, because it would reduce on risks associated with foreign construction business – *on the part of the international firms* –, and uphold professionalism amongst local firms. Most of all, the practicalities of reducing the digital gap would not only be implemented at educational level, but also at industrial level.

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