The Internet as an information conduit in developing countries: an investigation of World Wide Web usability among small and medium textile enterprises in Botswana

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Abstract

The Internet has been called the technology of the century because it is expected to reduce the development gap between developing countries and developed ones. This article examines the validity of that assertion. The researcher examines Internet use at two levels. The first level is the macrolevel of issues of Internet connectivity in developing countries and the second level is the microlevel of the usability of the World Wide Web (WWW) for information management in a developing country, Botswana. The two research methodologies of content analysis and case study were used for this study. The findings of this study are that entrepreneurs found a Website easy to use, but while there is a need for macropolicy to create national and global environments for using the Internet sustainable connection should not be universal, but should rather be based on the information management needs of a target population. Inherent infrastructural and socio-technical challenges should then be tackled as part of the effort to create a sustainable Internet usage.

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Introduction

The literature describes the Internet as an essential part of the development process (Hoffman, 2000; Kole, 2000; Mansell and When, 1998; Ngwainmbi, 2000). It further appeals to development organisations to speed up the development process by adopting the Internet and modern information communication technologies (ICT) (Thapisa, 2000; UNDP, 2001; World Bank, 1998). This paper is a summary of research that examined the validity of those assertions in relation to technical and socio-economic conditions prevailing in developing countries.

The main point of departure of the research was that information is a development resource that a community uses to fulfil its human needs as a result of the benefits that they receive as beneficiaries of socio-economic and technological progress. Some of these resources are finance, education, health, skilled personnel, infrastructure, appropriate environments in which to perform tasks, and raw materials. It is not the mere availability of these resources that facilitates development, but rather their use in a specific context.

Schram (1996) and Mchombu (1998) argue that information is an essential resource in the development process. Menou (1993, p. 4), however, contends "contrary to the views of 1950 and 1960, information is no magic recipe for development". The relationship between information and development is both complex and intricate. The type of media used to transmit the information further complicates the relationship. In the developing literature on information an impression is given that the Internet will enable developing countries to "leapfrog" and catch up with developed ones. This implies that the Internet will hasten information provision in the development process.

Objectives of the research

This research had two main objectives:
(1) Ascertain what existing technical and socio-economic environments affect the

usability of the Internet as an information resource in developing countries.

(2) Establish the degree of usability of the WWW as an information conduit in Botswana and other developing countries.

The specific questions driving the objectives can be found in Table I.

Methodology

Two research methods were used; namely, content analysis and a case study. Over 300 messages were analysed from three discussion lists dedicated to the Internet and development:

(1) the Global Knowledge (GK) list;
(2) the Department of International Development (DFID) list; and
(3) the Africa Technology Information and Development (AFTI-DEV) list.

The purpose of the analysis was to establish trends and issues relating to Internet use in developing countries. The case study was used to test the usability of the WWW as an information delivery tool in a developing country. The population of the study was a group of textile entrepreneurs in Botswana. The two methods were used sequentially, with data from the content analysis informing the process of the case study.

Population of study

There are two target populations in this study. The first target population was the virtual community of participants in the three e-mail discussion lists. The second was the Gaborone Chapter of the Botswana Textile and Small Business Association (BOTSBOA). These entrepreneurs are part of the small, medium and micro-enterprises that the government of Botswana sees as an engine for growth. The same sector has also been encouraged to adopt information technology (IT) in pursuing its development goals. During the research process, these entrepreneurs from the textile sector were exposed to the Internet. A Website was constructed for them, based on their expressed information needs. The group was then asked to evaluate the usability of the site to meet their business requirements.

Literature review

Although only 6 per cent of the world's Internet users live in developing countries, 84 per cent of the world's population lives in such countries (*Futurist*, 2000). The exponential growth of business transactions on the Internet threatens to exclude the bulk of the world's population who live in the developing world and who do not have access

Table I Research themes and questions

Research theme	Research questions
Information needs	1. What type of information do SMME (small, medium and micro enterprise) entrepreneurs need?
	2. What sources are currently used to provide information?
	3. Are the available information sources adequate?
Access	
1. Socio-cultural barriers	1. To what extent are gender, education and literacy levels limiting factors in accessing information?
	2. What are other socio-cultural hindrances to information access?
2. Physical barriers	1. To what extent do potential users have access to a computer with Internet connectivity?
Solutions	
1. Identify an Information technology (IT) solution	1. What computerised databases exist to provide current information?
	2. How much do users know about IT?
	3. What are their opinions about IT?
2. Design and install a Website	1. Describe the specifications for an information Website?
	2. How should these specifications be adapted to meet the needs of our target population?
	3. Does our database meet these specifications?
	4. To what extent does my database fulfil the needs of the target population?
	5. How should it be improved?
3. Relevance of the Web as an information delivery tool in Botswana	1. What is the degree of Web connectivity?
	2. What are the policy issues around Internet connectivity and Web availability?
	3. To what extent can the WWW be a tool for information delivery in Botswana?

to the Internet. Business on the Internet is concentrated among the 12 per cent of the world's population who account for 94 per cent of Internet use, and who control much of the world's wealth and information (Hegener, 1995).

The United Nations Economic and Social Council recognizes the need to harness the growth of the Internet and to use it as a tool for information exchange in developing countries (United Nations Public Information, 1999). Another United Nations organ, UNDP, notes that:

> . . . information communication technology is perhaps the central development issue at the dawn of the new millennium. Not only are the technologies the key to economic growth, they can impact on most pressing global issues (UNDP, 2001).

This assertion emphasizes the link between development (which often includes business growth) and indispensable information communication technology such as the Internet.

Ticoll (2000, p. 87) presents a contrary point of view. He reports that anti-globalization demonstrators at a G8 summit in Japan denounced Internet connectivity by asserting "the Internet connection will not cure malaria". There is obviously a degree of truth in the statement: connection alone is not a panacea for development problems (Ochieng, 2000). The value of the Internet in the development process is directly proportional to the degree to which those who use it can apply the information they obtain from it in the management of their day-to-day activities in business or industry (Reinecke, 2000). The Internet has to be used to store, manage and disseminate information that is relevant to development if it is to be useful to developing countries. The World Bank is concerned that unequal access to the Internet within developing countries may create a "digital divide" between those who have access to the Internet and those who do not.

The literature further indicates that the growth of the Internet in developing countries is hindered by the fact that equipment is expensive, telephone lines are poor, electricity is unreliable, illiteracy is widespread and definitive guiding government policies are absent (Mbambo, 1996; Kole, 1999; UNDP, 2001; Haddad and MacLeod, 1999). The situation is not uniform in all developing

countries (World Bank, 1998). The World Development Report (World Bank, 1998) states that countries such as Singapore, India, Thailand, Brazil and South Africa, that need to produce all of their own electronic equipment, have advanced further in Internet usage than those countries that import all computer components. Those countries that import fewer components are increasingly using the Internet to conduct business (Kirkman and Sachs, 2001). On the other hand, African countries that are emerging from wars or that are still engaged in wars, such as Somalia, Mozambique and the Democratic Republic of Congo, demonstrate the lowest levels of Internet usage and expansion (Jensen, 2001). For these countries being linked to the Internet is not a development priority.

Kirkman and Sachs (2001, p. 61) contend that the IT "revolution offers powerful weapons to foster economic growth. It is time developing countries benefited from them". They note that e-mail has proved effective in transmitting vital information about diseases in Africa.

Research findings

Content analysis of three discussion lists

All three lists focused on the role of the Internet in the development process. The contributors to the lists concurred that the usage of the Internet in developing countries was embryonic.

They identified the following issues as hindrances to the spread and usage of the Internet (our classification):
(1) financial constraints;
(2) education;
(3) infrastructure;
(4) content;
(5) policy implications;
(6) unequal access; and
(7) human resources.

While the three lists all concurred on the seven broad categories they obviously differ in the formulation of their responses in each category. While AFTI-DEV indicated that there was limited African content on the Web under the heading "Content", GK indicated that there is limited human resources capacity to develop Websites that would increase the volume of developing content on the Web.

This suggests that many problems remain to be solved before the Internet can be developed and made widely available for business, education and leisure in developing countries. It is not enough to develop and put up a Website. Other vital factors such as illiteracy, training, equipment, rural-urban differences and government control all need to be taken into account. The issue of local content also needs further examination.

The case study on which we report in the next section examines these overlapping issues in the context of the practical application of Web use in developing countries.

Case study

The case study revolved around the practical application of Internet use in a developing country.

Target population analysis

There are 858 registered manufacturing companies in Botswana. Dress making as well as weaving concerns are in the category of manufacturing companies. Of the 858,106 (12 per cent) are textile companies.

The group that constituted the research population for the case study were textile entrepreneurs who had formed themselves into an association, the Botswana Textile and Small Business Association (BOTSBOA). Table II illustrates the composition of the Gaborone chapter.

Ten members of the chapter acted as respondents to the site evaluation questionnaire. Respondent entrepreneurs were asked to select those statements that best described their knowledge of computing. Table III indicates their responses.

The low level of computer ownership and access to the Internet make digital information not easily accessible to this population. However, the existence of support organizations such as libraries and the Fedrieck Ebert Foundation, that support the sector and have digital resources, provide

Table III Knowledge of computers

Use of computers	Yes	No
I have never used a computer	60% (6)	40% (4)
I have basic knowledge of computers	40% (4)	60% (6)
I use computers often in my work		100% (10)
I have never used an ATM machine	40% (4)	80% (6)
I use it for e-mail		100% (10)
I use it for WWW		100% (10)
I use it for word processing	20% (2)	60% (4)
This is the first time I am using WWW	100% (10)	

opportunities for information providers in those organizations to be conduits for digital information.

Information needs analysis

The first step in producing the site was to establish the information needs of the target population and find ways of meeting them. A literature survey was conducted to find out how information is currently being provided. The research identified that the current information needs relate to information about markets, sources of fabrics, government schemes, information on how to write proposals and on short courses. Although some institutions providing such information were identified (such as libraries, extension offices and development agencies), their information holdings (comprising books, pamphlets, etc.) were deemed inadequate in terms of currency, accessibility and responsiveness to the needs of the information society (Mchombu, 1998). Most were printed sources housed in buildings and locations that were not easily accessible.

Mchombu (1998) lists areas in which small scale entrepreneurs needed information. At a meeting BOTSBOA entrepreneurs were asked to enumerate their information needs. Suggestions from the entrepreneurs, as well as suggestions found in the literature (Mchombu, 1998), were incorporated into this site. As can be seen in Table IV, the needs expressed by the entrepreneurs matched those stated by Mchombu. The content of the Website was based on these two complementary lists.

Table II Composition of target population

Gender		Education		Computer ownership	
Males	3	Primary certificate	10	Owns one computer	1
Females	24	Junior certificate	12	Do not own a computer	26
		First degree	5	Has access to the Internet	0

Table IV Information needs

Stated needs	Mchombu list	Items on site
Markets	Marketing information	Markets
Sources of fabrics	Sources of raw materials	Sources of fabrics
Information on government schemes	Financial information	Information on government schemes
Information on writing proposals	Legal information	Information on proposal writing
Information on short courses	Technical skills	Training information
	Business management	Banking

Design and development

The design of this site was influenced by the consideration that the users were neither highly word literate nor computer literate. The design therefore had to be simple. In spite of the fact that it can easily be updated and made widely available to users, the WWW is not a tool that is accessible to most people in Botswana (Mbambo, 1996). We therefore constructed the final product as a CD-ROM that could be modified for touch-screen use and audio technology for use in areas without Web access.

The actual development of the site in Microsoft Front Page$^{®}$ was outsourced in January 2000 to INTOWEB, from Pretoria, South Africa. The site was ready for initial running in February 2000. Between March and June various corrections (following several formative evaluations) were made and it was eventually ready for the summative evaluation in July 2000.

The final Website can be viewed at http://www.intoweb.co.za/botswana (see Figure 1).

Data was collected at several stages during the case study. Several data collection instruments were used in this research. These included a questionnaire, observation, and a

literature review. The analysis of the discussion lists also provided useful data for testing the prototype – in addition to influencing the process of the case study.

Evaluation results

First impressions

When they were asked what their first impressions of the Website were, all of the respondents (100 per cent) felt that it took too long to load. The time of day at which the exercise was done (14:00) may have influenced this response as the Internet usually operates more slowly around this time. All of the respondents (100 per cent) felt the site was attractive and that it caught their attention. When questioned about how they responded to the index page (which also gives users directions as to where they might go), 100 per cent of the respondents felt that the index page gave sufficient information.

The observations showed that the respondents also intently watched the site as it loaded. They liked the brightly coloured drapery that decorated the site and the pictures of their colleagues at a trade fair. Respondents pointed at the photographs in amusement as they recognised their colleagues. This connection helped them to feel at ease in the context of an otherwise new experience. It is important to note that none of the entrepreneurs felt frightened or scared of the technology. Their attitude could better be described as curious and expectant.

Ease of use

When they were questioned about how easy it was to use the site, 100 per cent of respondents indicated that it was easy to move around the site. Such an answer was more or less predictable since the site contained an ongoing "tutorial" that explained each of the items in the index page and why it was there. In addition to this, every

Figure 1 The opening screen
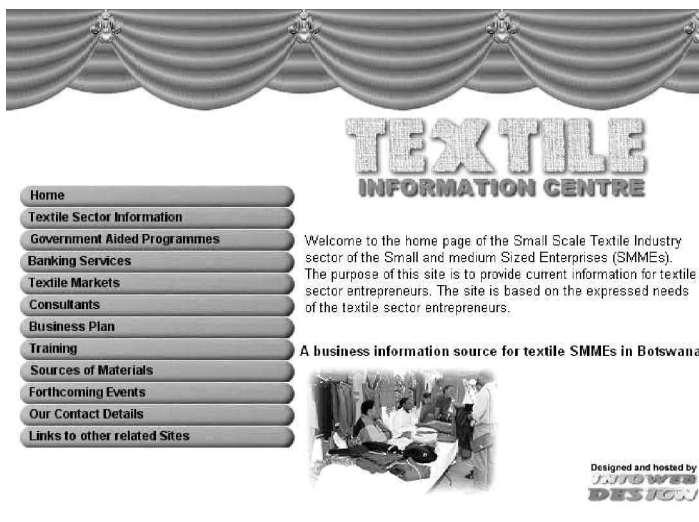
page had a drop-down menu with buttons representing each page.

Suggested improvements

On the question of what information they would have liked to see added to the site to make it more adequate for their needs respondents made the following remarks:

- it is adequate;
- [we need] more information on how to buy fabrics; and
- [we need] more information on how to sell.

When questioned about what other information could be added to the site in order to improve its quality, respondents indicated that the current contents were adequate both in terms of quality and quantity. The respondents all answered together by saying "*e siame*", a Setswana expression meaning "it is fine".

Control of the media

As they responded to the questions and examined the site, the respondents talked among themselves and asked one another questions about the site and what they were finding. It was gratifying to see the excitement as they clicked on the blue buttons that opened other pages and provided them with more information. Although they were all first-time users, the media did not intimidate them. They seemed to be in control of it.

Language

The fact that the site was presented in English did not seem to inconvenience the entrepreneurs to any noticeable extent. The entrepreneurs informally translated the English into Setswana for each other and proceeded to explore the site and the WWW through the links provided. The language factor (the use of English) was not a major deterrent.

Learning abilities

The users proved to be quick learners. They were motivated to see how the Internet could solve their problems of access to information and how such information might improve their businesses processes and prospects.

Sharing resources

The sharing of computers in a group obviously helped these users to obtain maximum benefit from the technology. They became one another's lab technicians and instructors. The sharing did not deter them but enhanced the comradeship that made the exploration easier and more fruitful. Communal sharing is a highly regarded community value among African people.

Sustainability

The last question concerned the circumstances under which they would return to use this site. The following responses were received:

- whenever I need information on markets (60 per cent);
- when I want to advertise my goods (20 per cent); and
- when I need to know more about BOTSBOA activities (20 per cent).

Synthesis of results

The practical experience of using the Internet showed that entrepreneurs were willing to use it in order to solve their business-related problems. Users were not deterred by the language used (English) or by a new and essentially unfamiliar technology. Working in groups created a friendly environment in which users could ask their peers for help and discuss their findings with one another. However, the immediacy that is created by the Internet led to a disappointment when the users found that they could not trade over the Internet without valid credit cards.

Both the analysis of discussion lists and the case study showed that the Internet environment in developing countries is not only embryonic, it is also uncoordinated and loaded with problems, both technical and socio-political, requiring both the government and civil society to solve them. The relevance of these findings goes beyond design issues. They incorporate other issues that concern the Internet, whether these arise out of discussion groups, chat lists or any other forums. They raise the fundamental question about whether developing countries should be pursuing the mirage of the Internet with such zeal when fundamental problems remain unresolved. Perhaps the Internet should be applied in certain sectors and not in all sectors of development? These are questions that need well-considered answers (Table V).

Table V Answers to research questions

Research questions	Findings in the case study
What type of information do SMMEs entrepreneurs need? What types of sources are currently used to provide information?	Entrepreneurs depended on informal and oral information from colleagues
Are the available information sources adequate?	They felt that current sources were inadequate because they did not give them all the information they required
Are gender, education and literacy levels limiting factors in accessing information? What were the other socio-cultural hindrances to information access?	The majority of the members were women. None of them had ever used the Internet before
	Most had a limited knowledge of English
	Although none of the participants had graduated beyond Junior certificate education, this level of schooling was not a barrier to accessing information since they depended on one another for information
Do potential users have access to a computer with Internet connectivity?	None of them had access to the Internet
What computerised databases exist to provide current information?	Business Linkages database of BOTSBOA
What levels of IT knowledge and perceptions exist?	Respondents had little to no knowledge of computing
What are the specifications for a good multimedia database? How should these specifications be adapted to meet the needs of a target population?	One that meets the anticipated needs of a target population
Does my database meet these specifications?	One should address specified information needs
To what extent does my database fulfil the needs of my target population? How should it be improved?	It does not; it should be improved because users want it to be of commercial value
	Although it supplied useful and requested information, the users wanted more
	It must be expanded to be responsive to the commercial needs of respondents
What is the degree of Web connectivity? What are the policy issues around Internet connectivity and Web availability? To what extent can the WWW be a tool for information delivery in Botswana?	While an infrastructure exists, Internet connection is controlled by the private sector. This will limit access to those who can afford it
	Botswana needs a multi-sector Internet policy that facilitates and enables e-commerce
	Because of current poor connectivity, the country may have to settle for convergence and standardisation between more than one more accessible kind of technology (such as radio and the WWW)

The application of the WWW case study affirmed the findings of the content analysis that there is indeed unequal access to the Internet, as well as a lack of policy on Internet provision. The case study, however, did show that entrepreneurs are keen to use the Internet for online trade. The small business sector, which is sustained by its profits, could benefit enormously from access to the Internet as an information source and as a medium for trade. The study showed that if the policy issues that inhibit access to the Internet were removed, and if users were given access to the Internet, they could solve more personal questions (such as language usage) and use the Internet to expand their businesses and make them vastly more profitable.

Conclusions

While the case study has shown that first-time users find the Internet easy to use, the content analysis of the discussion lists indicates that the environmental contexts and conditions in most developing nations are very different from those in developed countries – and that nearly all developing countries still suffer from disabling deficiencies, scarcities and shortfalls in numerous areas of development. The socio-economic, educational and political needs of developing countries are as diverse and complex (and often as intractable) as are their information needs. When certain necessary conditions for development and stability do not prevail in a developing country, mere access to

the Internet by a large number of citizens cannot suddenly remedy all their deficiencies and solve their problems (Table VI).

The study has shown that the Internet can be an extremely beneficial development tool in developing countries, provided that certain problems are resolved and provided that the governments of developing countries demonstrate that they have the political will to remove the obstacles that currently stand in the way of widespread Internet connectivity. While it is all very well to call indiscriminately for adoption of the Internet as a tool for development, the reality is that there are a number of issues that have to be resolved before the Internet can be used successfully as

Table VI Policy implications

Current situation	Policy implications
Stratified access by educated, gender, literacy and geographical location	Develop Internet provision policies that will enable usage by every sector of the population (but especially by the disadvantaged, the uneducated and the underprivileged)
Lack of provision of computers in schools	Devise ICT policies that will empower computer education in all schools
Lack of appropriate local content	Train and educate people so that they themselves will be able to place relevant local content on the Internet
Mechanisms for combining, radio, digital and print modes	Develop appropriate information policies that encourage the convergence and complementary use of technologies
The private funding of Internet access	Involve governments in funding access and in encouraging open competition
Lack of coordinated South-South Internet usage initiatives	Development of appropriate information exchanges between developing societies
African leaders do not demonstrate commitment to Internet issues	Encourage and establish appropriate government protocols that facilitate Internet access and commitment to appropriate universal Internet access and usage
There are only small numbers of individuals who place content on the WWW	Develop capacity in this area and pricing policies that facilitate affordable hosting, developing and publishing
Lack of coordination of institutions that provide and finance Internet education	Develop education policies that coordinate and facilitate computer literacy
A need for more role players to develop African content	Development of local capacity to develop and disseminate local content
Africans not participating in large numbers on such Internet bodies as ICANN	Government should make specific efforts to lobby for African participation on Internet driving bodies such as ICANN
Current usage of the Internet is largely driven by the needs of technology and the market place rather than by development needs	Identify specific developmental areas in which the use of the Internet can benefit an enormous number of people with a minimal outlay of expense
Limited band-width capacity to handle audio transmission	Remove government polices that prevent private broadcasting
Poor telecommunication infrastructure	Design policies to create and upgrade telecommunication capacity and thus provide adequate telecommunication infrastructure in the shortest possible time
Tele centres that are privately owned and not in any way subsidised by the government	Implement government subsidies and sponsorship of tele-centres as a matter of urgent policy
Excessively high import duties on equipment and restrictions on the use of telephones	Develop trade policies that encourage importation of the necessary kinds of technology and the abolition of import duties on equipment of this kind
African languages are not used on the Internet	Education and empowerment of Africans so that they can use their own languages on the Internet
Scattered and isolated virtual practitioners	Create virtual communities that enable isolated people to communicate with others in a virtual environment
The limited use of the Internet in distance education	Increase the use of the Internet in distance education

a developmental tool. These issues have been described at some length by the researcher in the text and relate mainly to the kind of infrastructure that is essential in any country before the Internet can function with maximum efficiency.

The site met the expressed information needs of users. It provided information that users had said they would like to have. Exposing users to the Internet also created new information needs, in particular a need for information about trading on the Internet. While they did not want more data on the site, they wanted a site of real commercial value to enable them to start trading. It is not sufficient to provide information that informs potential buyers about where material is located. When buyers receive such information, they should be able to act on it immediately.

The Internet has a potential to provide current information and to facilitate communication among many sectors of the population other than the small-scale business sector. Any sustainable adoption and usage of the Internet would require a careful sector-by-sector needs analysis. Specific and situation-based Internet provision is recommended rather than indiscriminate and wholesale national provision. Needs analysis and market research should precede any kind of Internet provision. Providers, suppliers and designers should examine every aspect of each sector's needs – as well as each sector's readiness to use the Internet before facilitating access for that sector. If it is used in this way, the Internet will serve a specific function in a specific situation and therefore provide maximum benefit to a particular group of people (rather than random benefits to a diffuse and undefined population). The Internet should be used as a precise and effective tool in any process that facilitates development – not merely as an end in itself.

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