

E-Readiness Assessment of Small and Medium Enterprises in Egypt: A Micro Study*

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1. Introduction

A number of studies have been conducted towards assessing countries' e-readiness – namely, their preparedness for the digital world. Assessments were based on combinations of indicators such as e-connectivity, human capital, business climate, leadership and others. Quantitative and qualitative indices were devised and used to evaluate and rank countries on the e-readiness scale.

While providing insight into the overall e-readiness of countries on the macro level, few studies have attempted to evaluate e-readiness from a micro perspective. In particular, a small number of studies have undertaken as assessment of the adoption of information and communication technologies (ICTs) in small and medium enterprises (SMEs) in the United States, Australia, some European and Asian countries [1]. However, none was done for any of the countries in the Middle East and North Africa region. This paper takes on this endeavor. It is the first attempt to adopt a micro approach to assess e-readiness of SMEs in an Arab country. The objective of the research is to assess the e-readiness of SMEs in the textile sector in Egypt, particularly their preparedness for electronic commerce. It is the first step in a line of research that looks deeper into the preparedness of different sectors in Egypt for embracing and internalizing ICTs.

The paper is divided into 4 sections. Following the introduction, the second section is a brief review of the literature and methodologies used for e-readiness assessments, highlighting Egypt's macro e-readiness score and ranking as presented in these studies. The third part includes the micro study, starting by a brief description of the textile sector and the firms selected, to be followed by results of the field research and an assessment of the firms' e-readiness. The fourth section presents conclusions and recommendations.

2. E-readiness: From Macro to Micro Analysis

The literature on macro e-readiness assessment has taken two approaches. The first group of studies undertakes a quantitative assessment, whereby countries are assigned numerical scores depending on how well they have performed on specific components of the e-readiness measure. A weighted average is calculated based on the relative importance accorded to these components. This approach has been adopted by, among others, the Economist Intelligence Unit (E-Readiness Indices), the Center for International Development at Harvard (Network Readiness Index), the International Data Corporation (Information Society Index), the United Nations Conference on Trade and Development (UNCTAD ICT Development Indices), and the United Nations Development Program (Technology Achievement Index) [2].

The second group of studies concentrates on qualitative measures, assessing components such as connectivity, human capital, applications, sophistication of use, and geographical dispersion. Assessments often highlight suggestions for improvements in specific components. Among these are the studies undertaken by McConnell International, Mosaic and the Computer System Policy Projects Readiness Guide [3]. A detailed coverage of quantitative and qualitative indices and their respective components and relative weights is offered in Table 1.

Table 1: E-Readiness: Macro Indices

| | Index | Component |
|-----------------------------|--|--|
| Quantitative Indices | Economist Intelligence Unit (2003) | Connectivity & Technology Infrastructure (25%) |
| | | Business Environment (20%) |
| | | Consumer and Business Adoption 20% |
| | | Legal and Policy Environment (15%) |
| | | Social and Cultural Infrastructure (15%) |
| | | Supporting e-services (5%) |
| | Network Readiness Index (Center for International Development, Harvard University, 2001-2002) | Network Access |
| | | Networking Learning |
| | | Networked Society |
| | | Networked Economy |
| | | Network Policy |
| | Networked Readiness Index (Center for International Development Harvard University, 2002-2003) | Network Use (1/2) |
| | | Enabling Factors(1/2) Networked Economy (1/4) Network Policy (1/4) Networked Society (1/4) Network Access(1/4) |
| | | Computer infrastructure |
| | | Information Society Index (IDC, 2000-2002) |

| | | |
|----------------------------|--|--------------------------------------|
| | | Information Infrastructure |
| | | Social Infrastructure |
| | | Information Infrastructure |
| | Technology Achievement Index (UNDP, 2001) | Creation of technology (1/4) |
| | | Diffusion of recent innovation (1/4) |
| | | Diffusion of old innovation (1/4) |
| | | Human Skills (1/4) |
| | ICT Development Indices (UNCTAD, 2001) | Connectivity |
| | | Access |
| | | Policy |
| | | Usage/Telecom Traffic |
| Qualitative Indices | McConnell International (2000-2002) | Connectivity |
| | | E-Leadership |

| | | |
|-------------------------------|---|---------------------------|
| | | Information Society |
| | | Human Capital |
| | | E-Business Climate |
| | Readiness Guide (Computer Systems Policy Projects CSPP, 2001) | Network Infrastructure |
| | | Networked Places (access) |
| | | Networked Applications |
| | | Networked Economy |
| | | Networked world |
| | A framework for Assessing the Diffusion of the Internet (Mosaic Group, 2001) | Pervasiveness |
| | | Geographical Dispersion |
| | | Sectoral Absorption |
| Connectivity Infrastructure | | |
| Organizational Infrastructure | | |
| | Sophistication of Use | |

Source: See References page 10 for respective sources.

In both quantitative and qualitative macro assessments, Egypt's e-readiness has been rated as modest. Egypt was included in all five quantitative studies, and was accorded a very modest macro e-readiness score (Table 2). Egypt was also covered by the McConnell qualitative studies (2000 and 2001), with a recommendation for improvement needed for e-leadership and information security, and *substantial* improvement required in connectivity, human capital, e-business climate.

Table 2: Macro E-Readiness - Egypt and Selected Countries

| <u>Countries</u> | <u>EIU Indices</u> | | | | | | <u>NRI Indices</u> | | | | | |
|------------------|--------------------|----------------------------------|-------------|----------------------------------|-------------|----------------------------------|--------------------|----------------------------------|-------------|----------------------------------|-------------|-----------------------------------|
| | 2002 | | 2003 | | 2004 | | 2002 | | 2003 | | 2004 | |
| | Score | Rank (out of 60 countries) | Score | Rank (out of 60 countries) | Score | Rank (out of 64 countries) | Score | Rank (out of 75 countries) | Score | Rank (out of 82 countries) | Score | Rank (out of 102 countries) |
| Sweden | 8.32 | 4 | 8.67 | 1 | 8.25 | 3 | 5.76 | 4 | 5.58 | 4 | 5.2 | 4 |
| Finland | 8.18 | 10 | 8.38 | 6 | 8.08 | 5 | 5.91 | 3 | 5.92 | 1 | 5.23 | 3 |
| Hong Kong | 8.13 | 14 | 8.2 | 10 | 7.97 | 9 | 5.23 | 14 | 4.99 | 18 | 4.61 | 18 |
| India | 4.02 | 43 | 3.95 | 46 | 4.45 | 46 | 3.32 | 54 | 3.89 | 37 | 3.54 | 45 |
| Korea | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 4.86 | 20 | 5.1 | 14 | 4.6 | 20 |
| Tunisia | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 4.16 | 34 | 3.67 | 40 |
| Nigeria | 2.97 | 55 | n.a. | n.a. | n.a. | n.a. | 2.1 | 75 | 2.62 | 74 | 2.92 | 79 |
| Egypt | 3.76 | 48 | 3.72 | 51 | 4.08 | 51 | 3.2 | 60 | 3.13 | 65 | 3.19 | 65 |

| <u>Countries</u> | <u>ISI Indices</u> | | <u>ISI Indices</u> | | <u>TAI</u> | |
|------------------|--------------------|----------------------------------|--------------------|----------------------------------|------------|----------------------------------|
| | 2002 | | 2003 | | 2001 | |
| | Score | Rank (out of 55 countries) | Score | Rank (out of 55 countries) | Score | Rank (out of 72 countries) |
| Sweden | 7087 | 1 | 989 | 2 | 0.703 | 3 |
| Finland | 6422 | 8 | 934 | 4 | | |
| Hong | 6255 | 11 | 825 | 16 | 0.455 | 24 |

| | | | | | | |
|----------------|-------------|-----------|------------|-----------|--------------|-----------|
| Kong | | | | | | |
| India | 1331 | 18 | 250 | 51 | n.a. | n.a. |
| Korea | 5596 | 51 | 850 | 12 | 0.666 | 5 |
| Tunisia | n.a. | n.a. | n.a. | n.a. | 0.255 | 51 |
| Nigeria | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Egypt | 1478 | 53 | 337 | 47 | 0.236 | 57 |

Source: See References p. 10 for respective sources

An overall look at macro assessment tools leads to two major conclusions. First, a common parameter in macro assessments is the inclusion of some measure of physical infrastructure/usage (e-infrastructure) and education (including knowledge of ICTs). These represent the lowest common denominator in assessing the macro e-readiness of countries, and are complemented by policy and economic environment settings. Second, while providing general insights into the countries' e-readiness, macro studies suffer a major drawback: the choice of components and their relative weights may vary from one country to the next. Relative measures and country rankings may ignore internal variations within a country, and as such could be misleading. Micro studies are therefore recommended as they capture many of the factors that may escape macro analysis, and hence offer a more accurate picture. It is from that conviction that I move to the current study.

3. E-Readiness of Textile SMEs in Egypt:

The present research is a pilot study to assess the e-readiness of a group of SMEs in the textile sector in Egypt. As such, the study will assess the firms' level of connectivity, awareness and usage of ICTs in marketing, production and management. It is important to test if 'size matters', i.e. whether smaller firms are less prepared to embrace ICTs. It will also be important to identify the nature of, and barriers to, ICT usage by these firms.

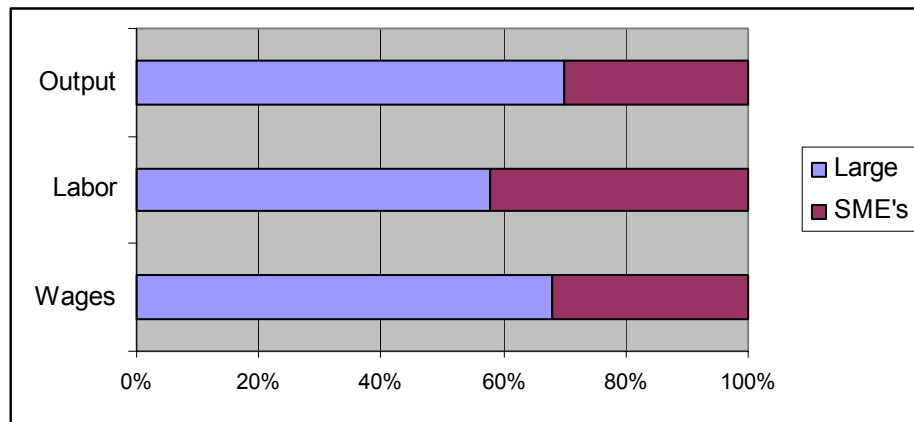
3.1. Why SMEs in Egypt's Textile Sector?

Egyptian textile SMEs were chosen for three reasons. First, SMEs generally stand to gain large potential benefits from ICTs. Second SMEs represent a large share of Egypt's economy. Finally, these particular firms operate in a sector that has an established history of comparative advantage in Egypt.

To begin with, ICTs offer many potential benefits for SMEs. ICTs reduce transactions costs, remove barriers to entry, and as such effectively reduce the optimal size of the firm. By allowing effective networking, ICTs offer small firms an opportunity to overcome the competitive advantage of larger firms gained due to economies of scale. ICTs also allow the use and management of supply chain networks, which in turn facilitates procurement, inventory control, supply processes management, production costs monitoring and quality control. In addition, ICTs offer SMEs an excellent tool for marketing and distribution, which facilitates responsiveness to market demand and customization of offerings. They also provide SMEs with an opportunity for innovation and the emergence of new products and services (Pease and Rowe 2003). ICTs help small entrepreneurs overcome information poverty; entrepreneurs hence become more connected, more certain, less risk-averse, and more capable of making well informed decisions (OECD 2000c). By empowering the small entrepreneur, ICTs offer the potential for increasing exports, promoting growth as well as human development.

This opportunity can be very relevant to Egypt, where, SMEs represent almost 99% of the number of companies in the private non farm agricultural sector in Egypt (Abdel Maksoud and Youssef 2003). In 1996, SMEs provided 80% of jobs and generated 80% of the value added in the non agricultural private sector. In 1991/2, SMEs contribution to GDP exceeded 55%, and reached almost 60% in 1996/7. Between 1992/3-95/6, SMEs provided 30% of industrial output, more than 40% of employment, and more than 30% of wages in the industrial sector (Ministry of Foreign Trade; see Fig. 1)

Figure 1
Relative weights of large firms in industrial indicators in Egypt (92/93-95/96)



Source: Ministry of Foreign Trade website, data calculated by Lobna Abdellatif based on CAPMAS Data (www.sme.gov.eg)

In line with this, the textile sector was chosen because it is one of Egypt's traditional industries with an established history of comparative advantage. The sector employs around 30% of Egypt's industrial labor force, and 11% of labor in the private sector. Textiles account for 5.4% of Egypt's exports. In 2001, textiles represented more than 50% of Egypt's Exports to the United States in 2001 (HC Brokerage 2002)

Moreover, utilizing ICTs in the textile sector allows for benefits to be gained by "old economy" sectors from the advances made in the "new economy". It has been argued that the importance of the new economy lies mainly in its impact on increasing productivity in the traditional old economy sectors. This is an

opportunity for Egypt to catch up with the information revolution, even if only on grounds of ICT use.

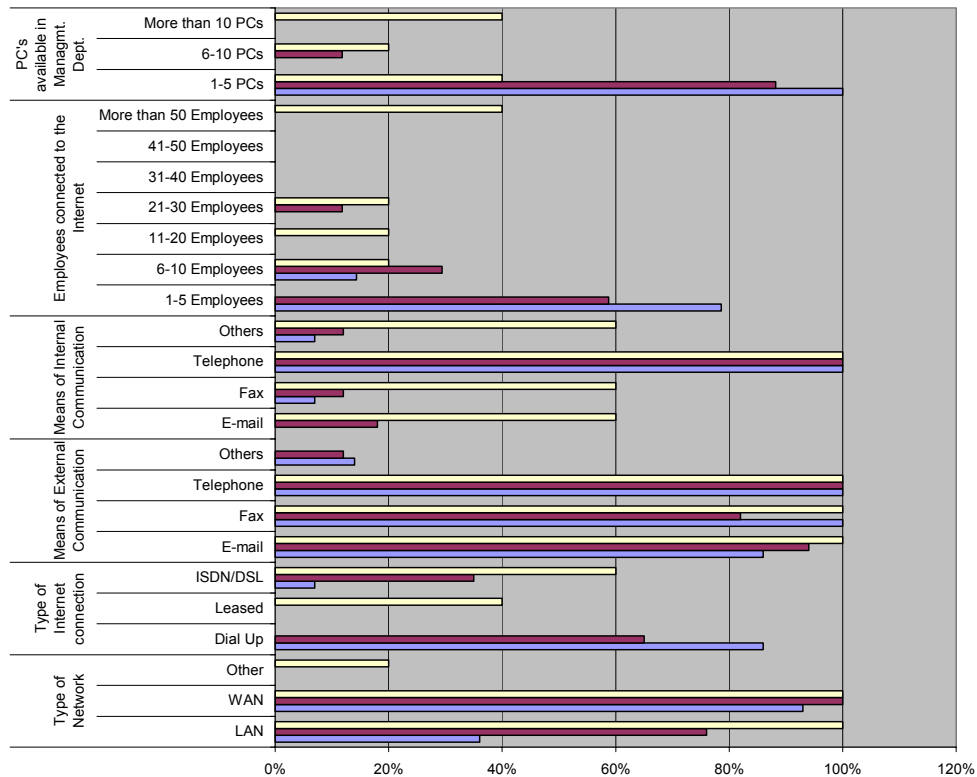
3.2. The Study

Field research was conducted on a sample of 36 firms specialized in the textile, specifically garment industry and located in the greater Cairo region. The definition of “small” and “medium” here is taken to refer to 30-199 workers and 200-999 workers respectively. Large firms are included for comparison (more than 1000 workers). A total of 14 small companies, 17 medium, and 5 large companies were surveyed and filled out a questionnaire providing information on variables such as e-infrastructure, human capital, actual and perceived use of ICTs and barriers to implementing ICTs. Given that the sample size is small, the results below are taken as providing preliminary indicators rather than grounds for broad generalizations. Acknowledging that, some interesting insights can be drawn nonetheless.

3.2.1. Small Firms

First, while all small firms have telephone connections, they have modest levels of personal computers (PCs) intensity and internet connectivity. None of the small companies has more than 10 employees connected to the Internet, and all of them have less than 5 PCs in management. They rely mostly on dial up for internet connectivity (Fig. 2). Small firms also have the lowest percentage of software ownership (Fig. 4),

Figure 2



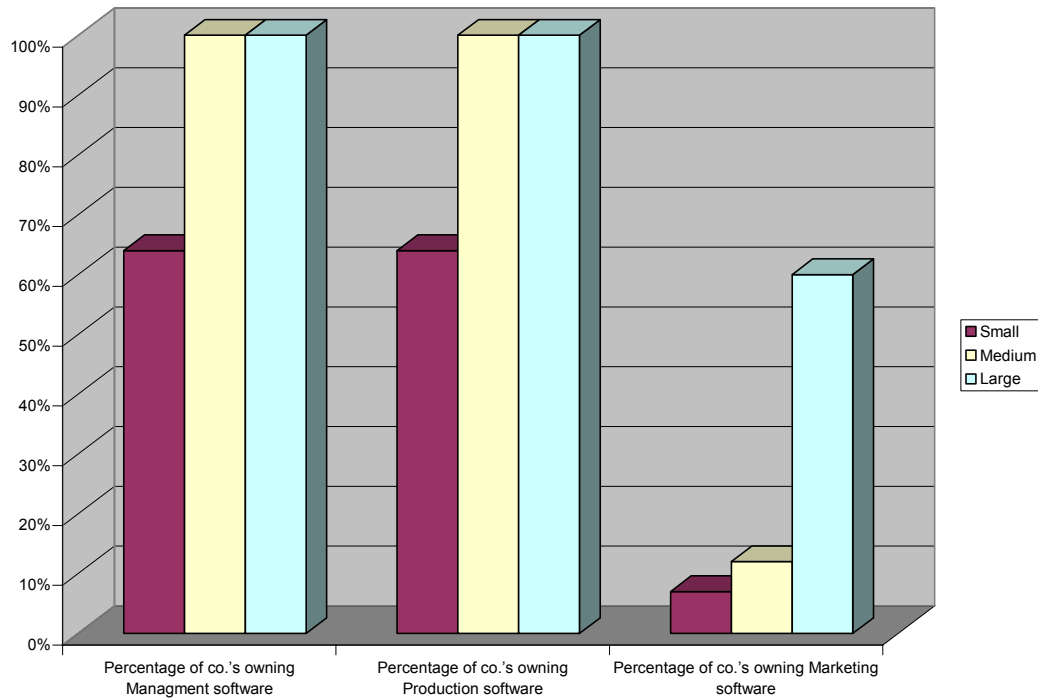


Figure 4

While more than one third of the small firms agreed that e-commerce will improve sales (Fig. 5), their use of ICTs for sales transactions is limited to sales and e-procurement and at very low levels (14% and 7% respectively). None of the small firms uses ICTs for quality control, order tracking or maintenance (Fig. 6). Although the use of ICTs by small firms for marketing, research and offers surpass medium and large firms, in absolute terms this use is modest and offers much room for expansion (see Fig. 6).

Figure 5

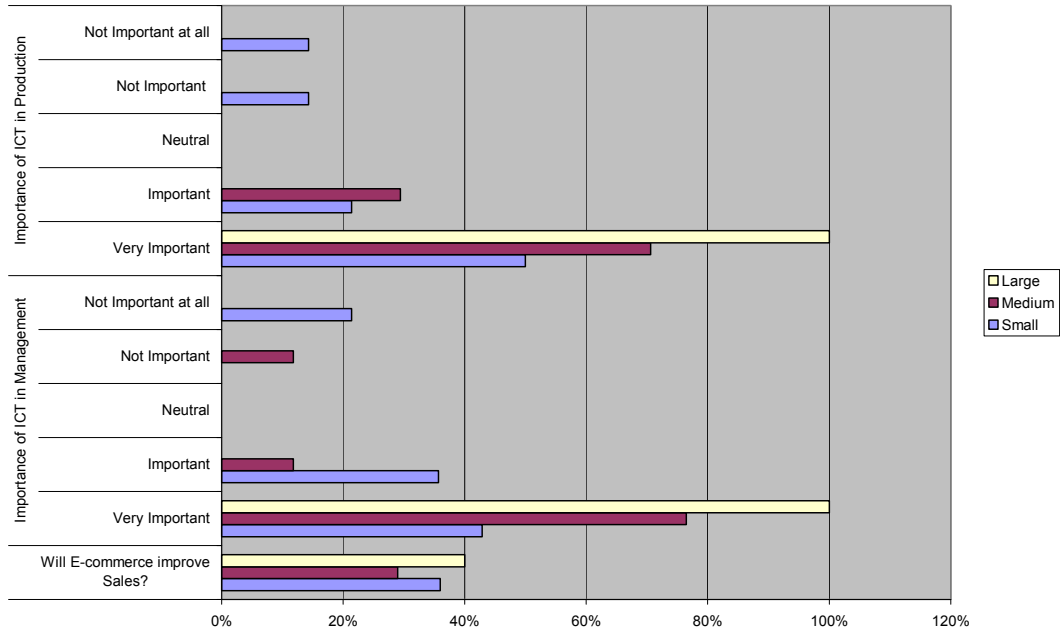
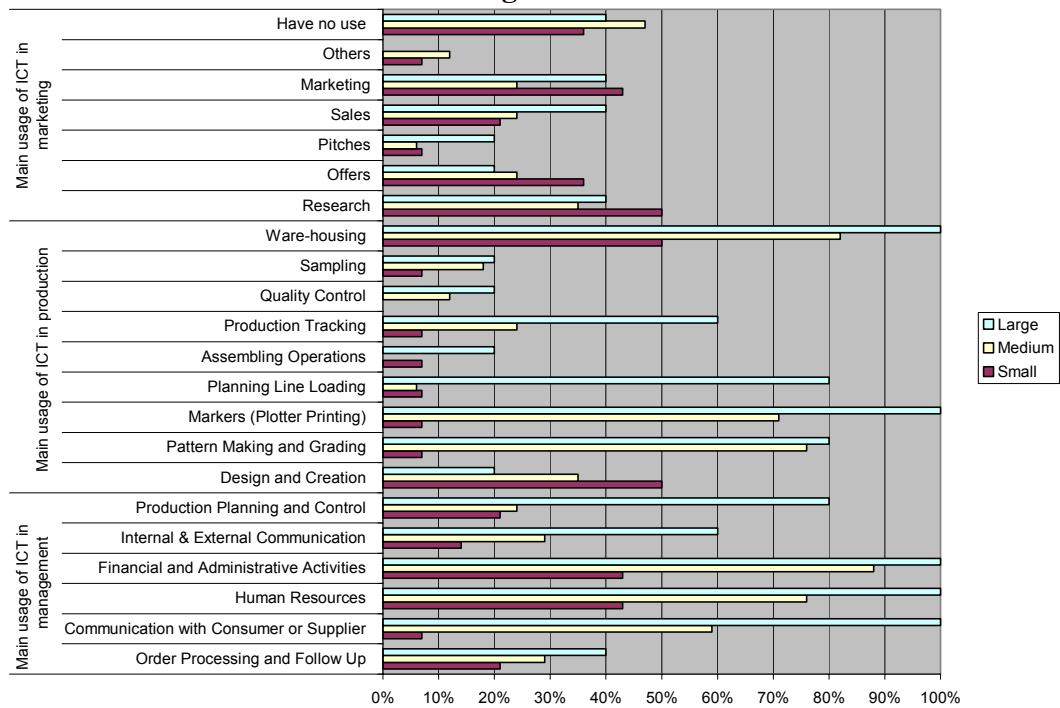
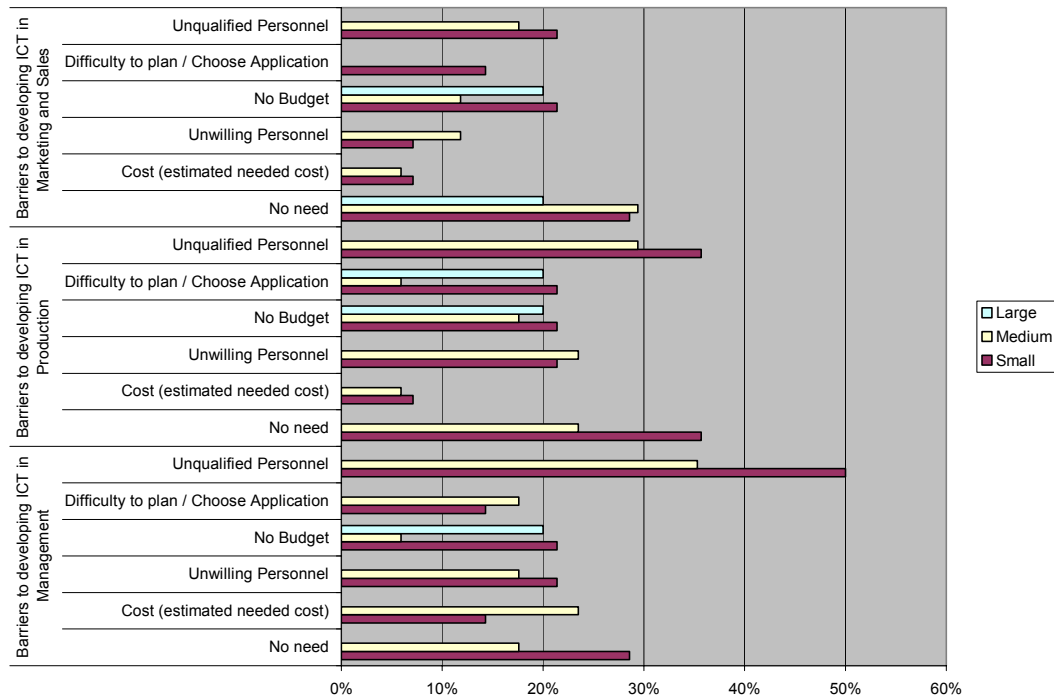


Figure 6



In line with this, limited awareness came as the top barrier to implementing ICTs in marketing (Fig 7). Limited awareness (the “lack of need” expressed by almost 30%), is actually followed by “unqualified personnel”, then “limited budgets”. This comes contrary to original expectations that the cost constraint would be the highest barrier to implementing ICTs for small firms.

Figure 7



Next, small enterprises expressed a relatively high degree of perception of the role of ICTs in management. About 70% perceived the role of ICTs in management as “at least important” (Fig. 5). Nevertheless, in practice, hardly more than 40% of the firms used ICTs for any one aspect of management (Fig. 6). ICTs were mainly used for human resources and financial and administration activities.

When asked about barriers to implementing ICTs in management for small firms, the top barrier was “unqualified personnel” (50% of firms), followed by lack of awareness (“no need”; 29%). Budgetary constraints followed (Fig. 7). Again we witness the need for training, upgrading human capital, and increasing the level of awareness of the role of ICTs for small firms.

When asked about the importance of ICT in production, again 70% of the small firms mentioned it was at least important (Fig. 5). Still, with the exception of using ICTs for design and creation and for warehousing (50% of firms for each category) [4], the use of ICTs by small firms for other aspects of production (e.g. sampling, tracking, planning line loading, etc.) is very low (Fig. 6). Again, “unqualified personnel” and “no need” come as the top barriers to implementing ICTs in production for small firms (36% each) (Fig. 7). This is a confirmation of the need for upgrading human capital and increasing awareness of the role of ICTs for small firms.

Based on the above, it is feasible to conclude that based on connectivity, e-infrastructure, and ICT use in marketing, production and management, the level of e-readiness of the small firms under study is very modest. For these small firms to

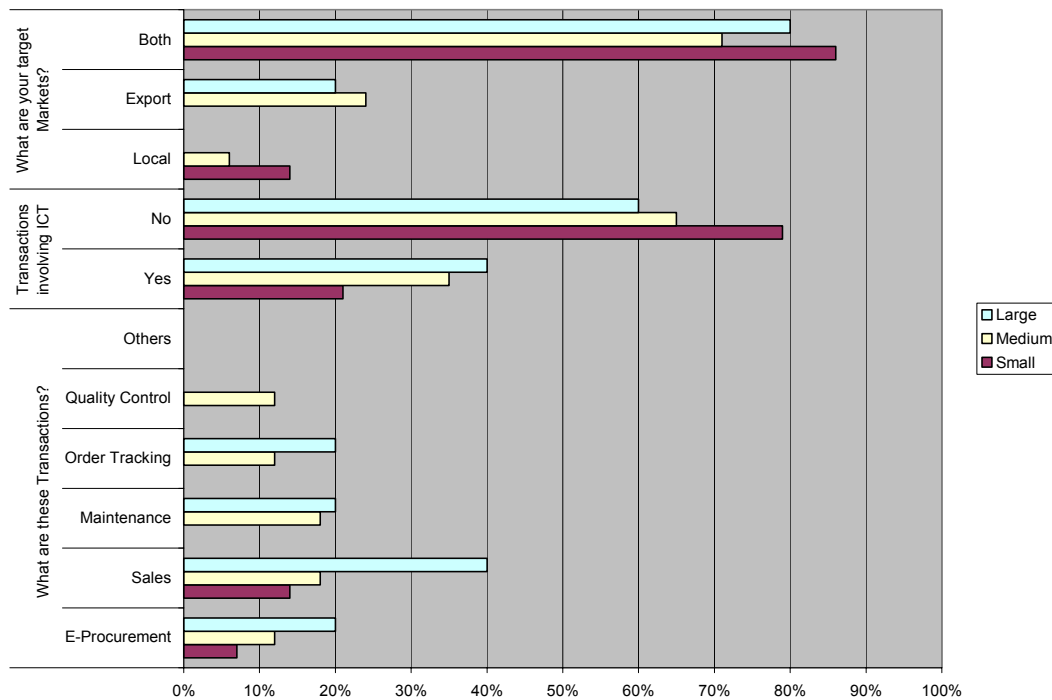
be e-ready, there is a strong need for expanding the use of ICTs in marketing, production, and management which would be fuelled by upgrading their weak e-infrastructure along with raising awareness and upgrading human capital. These seem to be the pressing needs for e-readiness for the small enterprises surveyed.

3.2.2. Medium Firms

Medium firms also have modest connectivity. While all medium firms use telephones, they all have less than 30 employees connected to the Internet and less than 10 PCs in management (almost 90% have less than 5 PCs) (Fig. 2). Compared to firm size, these numbers deem the e-infrastructure for medium firms relatively more modest than small firms. Medium firms are, however, relatively high on owning management and production software, in fact as high as large firms. This comes in sharp contrast to the relatively low percentage of their ownership of marketing software (Fig. 4)

Medium sized firms may be a step ahead of their small counterparts in that they have ICTs included in all sales transactions (quality control, order tracking, maintenance, sales, and e-procurement), albeit with a small percentage (never exceeding 20% of the firms) [5] (Fig. 3). This might be a promising scenario as these firms also have a relatively high share of “export only” segment. It is, however, disappointing that when asked if e-commerce was expected to improve sales, the least level of awareness came from medium firms (Fig. 5).

Figure 3



In line with this, the level of use of ICTs by medium firms for marketing is low. More than 45% of the firms have no use for ICT in marketing (Fig. 6). Only 10% of

medium firms owned marketing software (Fig. 4). It is perhaps no surprise that lack of awareness came as the number one barrier to using ICTs for marketing for medium firms (Fig. 7). As in the case of small firms, “unqualified personnel” came as the number two barrier to implementing ICTs in marketing. Again there is a strong need for raising awareness and for upgrading human capital for raising the e-readiness of medium sized firms.

The level of perception of the importance of using ICTs in management is a step higher for medium sized firms. Almost 90% rated it as at least important (Fig. 5). In practice, medium firms use ICTs mostly for financial and administrative purposes, as well human resources (Fig. 6). Like for small firms, there is a need for medium sized firms to extend the use of ICTs to other components of management (e.g. order processing and follow up, internal and external communication). Like small firms, medium firms ranked “unqualified personnel” as the number one barrier to using ICTs in management (about 35% of firms) (Fig. 7).

In production, all medium firms viewed ICTs as at least important (Fig. 5). Actual use, however, did not reflect that. While more than 80% of medium firms use ICTs for warehousing, more than 70% for markers (plotter printing), and 60% for pattern making, a small portion of firms utilize ICTs for other aspects of production (e.g. design and creation, sampling, line loading, production tracking, quality control, etc.) (Fig. 6). There is room for more use of ICTs in production for medium firms to reflect the relative high degree of awareness. Like in management, the number one barrier to implementing ICT in production for medium sized firms is “unqualified personnel” (Fig. 7).

Based on the above, medium sized firms are generally one step ahead of small firms in that they have a higher degree of awareness and implementation of ICTs in management and production. Awareness and use of ICTs in marketing is still modest; so is the level of e-infrastructure and connectivity. Barriers to ICT implementation remain the same: the lack of qualified personnel and the lack of awareness. Again the key to raising these firms e-readiness is upgrading the human capital and raising awareness along with improving their e-infrastructure.

3.2.3. Large Firms

Large firms connect to the Internet using ISDN/DSL [6] or leased lines (60% and 40% respectively) (Fig. 2). Despite that, and given that they employ more than 1000 employees each, 60% of large firms have less than 30 employees connected to the Internet and less than 10 PCs in management. Relatively speaking, these numbers point to a relatively ‘more modest’ e-infrastructure for large firms compared to small and medium enterprises. This is an interesting scenario, and leaves us wondering if connectivity was actually inversely proportional to firm size.

Most of the large firms, however, owned management and production software. Their ownership of marketing software is not as widespread. Less than 60% of firms owned marketing software (Fig. 4). This has implications on the overall level

of awareness of the role of ICTs in marketing as opposed to management and production.

Indeed, while only 40% of large firms thought e-commerce could improve sales, all 100% percent of large firms believed ICT to be very important in management and in production (Fig. 5). This mirrors the scenarios witnessed for small and medium enterprises, where a relatively stronger weight was placed on the importance of ICTs in management and production as opposed to sales transactions and e-commerce.

As far as actual use is concerned, Fig. 6 shows that 40% of large firms have no use of ICTs for marketing purposes. In management, on the other hand, all large firms use ICT for financial, administrative and human resources. All large firms also use ICTs for communication with consumers or suppliers, which is a clear difference from the other two groups of firms. Almost 80% of large firms use ICT for production planning and control, and 60% use for internal and external communication.

Large firms also use ICTs relatively more extensively in production. All large firms use ICT in warehousing and markets (plotter printing). A large portion (80%) use in pattern making, planning line loading, and other use elsewhere, sometimes low (Fig. 6).

Unlike small and medium enterprises, large firms brought up budget concerns as the number one barrier to the use of ICT in management and in production (Fig. 7). In fact, “no budget” was the only barrier given to the use of ICT in management, and a significant barrier along with technical difficulties hindering the use of ICT in production for large firms. This echoes the relatively stronger awareness of the role of ICTs in management and production, and perhaps a realization of the required investments.

Large firms’ relatively limited awareness of the role of ICTs in marketing shows up again in the only incidence of expressing “no need” as a barrier to implementing ICTs in marketing (Fig. 7). Limited awareness was, however, brought up along with the budget constraint barrier (20% each).

In line with this, one may conclude that positive signs for a higher e-readiness for large firms are the stronger channel of Internet connectivity and the degree of awareness and use of ICTs in management and production. A negative sign, however, is the relatively weak e-infrastructure and the low level of awareness of the role of ICTs in marketing and the potential benefits from e-commerce. Human capital was never brought up as a barrier. It seems that the priority for raising the e-readiness of larger firms is strengthening the e-infrastructure and increasing awareness of the role ICTs in marketing.

3.3. Synthesis of Survey Results

A synthesis of the above results brings to the fore a number of interesting conclusions. First, while all firms surveyed are low on connectivity, it does seem that size does not actually matter as far as the *level* of connectivity is concerned. In fact, large firms are doing relatively worse on the numbers of PCs and Internet users. However, it does seem that the *type* of connectivity, Internet network and *use* of email for communication is generally proportionate to size. Large firms have either ISDN/DSL or leased lines, while small firms rely relatively more on dial up. The use of Internet and email for communication increases as firm size increases (Fig. 2). It will be important that large firms utilize the high quality networks that they have access to, partly by increasing the necessary infrastructure, namely PCs and the number of connected people. For small and medium firms, however, there is a need to increase the present e-infrastructure, and/or expand usage of ICTs.

Next, in all firms and with varying degrees, ICTs are mostly used for conventional purposes, namely management and production, specifically financial, administrative and human resource management. This, in part, reflects the relatively higher awareness of the role of ICTs for traditional use (management, then production) as opposed to awareness of the potential benefits of innovative ICT usage for marketing and e-commerce. Indeed, the use of ICTs for marketing is generally less than ICT use in management and production [7].

Overall, firms' usage of ICTs is generally proportional to size. Involving ICTs in sales transactions (Fig. 3), ownership of marketing, management and production software (Fig. 4), and the use of ICT for management (Fig. 5) are all directly proportional to size. With the exception of design and creation, one may make a similar conclusion about the use of ICTs in production. The case for marketing is not as clear cut (Fig. 5).

Contrary to expectations, budgetary concerns are not the leading barrier to ICT implementation for small and medium enterprises. The lack of qualified personnel was the number one barrier for implementing ICTs in both management and production for both small and medium firms. Limited awareness came next. For large firms, budgetary concerns emerge, sometimes as the only barrier. This may imply the conclusion that human capital and awareness need to be satisfied as prerequisites before affording the luxury of worrying about costs of ICT investment [8].

4. Conclusions

The present study is a preliminary effort to assess the e-readiness of small and medium enterprises in the textile sector. Large enterprises were surveyed for comparison. Based on connectivity alone, neither small nor medium firms under study were found as close to being e-ready, and large firms present a modest potential (Table 3). However, extending e-readiness to include the use, awareness and barriers to ICTs, one may conclude that e-readiness is in general proportional to size, and hence larger firms are the most e-ready.

Table 3: A Preliminary E-Readiness Assessment - Summary*

| | | Small | Medium | Large |
|--|-------------------------------|---------------------|---------------------|-------------------------------|
| Connectivity/E-infrastructure | Level | L | L | L |
| | Type | L | L | H-M |
| | Software Ownership | L | M-H | H |
| ICT Use in Transactions | Awareness | L | L | L |
| | Use | L | L-M | M |
| ICT Use in Marketing | Awareness | L | L | L |
| | Use | L-M | L | M |
| ICT Use in Production | Awareness | M | H | H |
| | Use | L | M | M-H |
| ICT Use in Management | Awareness | M | H | H |
| | Use | L | M | H |
| Barriers to ICT use in Marketing | | Awareness/Personnel | Personnel/Awareness | Awareness |
| Barriers to ICT use in Production | | Personnel/Awareness | Personnel | Budget |
| Barriers to ICT use in Management | | Personnel/Awareness | Personnel | Budget/Technical Difficulties |
| E-Readiness** | Connectivity/E-infrastructure | L | L-M | M |
| | ICT Awareness | L-M | M | M |
| | ICT Use | L | L-M | M |
| | Overall*** | L | M | M |

* L: Low; M: Medium; H: High

** Here a preliminary ranking is done based on the average for each category, for example connectivity is taken as the average of the three components included under connectivity (level, type, software ownership)

*** Overall E-Readiness is an average of the above three cells (connectivity, awareness and use).

Nevertheless, one could make an argument for medium firms. First, large firms could end up being more “locked in” specific technologies, and the switching costs might be a concern. Moreover, and despite their modest connectivity, medium firms are generally one step ahead of small firms in that they have a high degree of awareness and some base of implementation of ICTs in management and production. In fact medium firms may possess a reasonable level of dynamism and awareness, which could provide a promising potential for engaging in e-commerce, and hence could be the most e-ready, relatively speaking.

Based on that, increasing the e-readiness of medium sized firms would require heavy investment in human capital, to be complemented by raising awareness and upgrading levels and types of connectivity. For small firms, priority should be directed to increasing awareness of the role of ICT, together with improving e-infrastructure and human capital. It would be beneficial for small and medium firms to work in clusters in order to benefit from economies of scale. There is a wide scope for public/private partnerships to raise the level of e-readiness for small and medium enterprises in the economy. Such projects should be placed as priorities on the development plan and donor support agenda.

A final point emerging from this study is that the SMEs surveyed are low on their e-readiness not only because of the low level of their e-infrastructure, but because of the more serious barriers related to awareness and human capital. By the same logic, SMEs development in general and their e-readiness in particular will be affected by traditional old economy challenges such as financing issues, legal infrastructure, policy setting and the business environment. One might then extend the micro e-readiness concept to include such old economy challenges that will affect SME e-readiness. Given that the Information Society entails maintaining a smooth interaction between “new” and “old” economy, as well as developing the “e” and the “non-e” components, a comprehensive micro index for e-readiness is a challenge that is worth pursuing. This will be the subject of future research.

Endnotes

* This study is based on work done in collaboration with the Egyptian Ministry of Communication and Information Technology and Context Consulting & Services, with financial support from the World Bank.

1. These are included in the list of references
2. See references for respective sources
3. See references for respective sources
4. It is interesting that the percentage of small firms using ICTs for design was higher than that for medium and even large enterprises.
5. Medium sized firms are the only ones using ICTs in quality control.

6. ISDN refers to Integrated Services Digital Network and DSL is short for Digital Subscriber Line. Both types of connectivity are superior to dial up in quality, speed, and scope of Internet use.
7. With the exception of some components of marketing for small firms, e.g. research.
8. This point was brought up in other studies on SMEs, e.g. OECD 2000c.

References

- Abdel Maksoud, Samer and Mohamed Abdel Aziz Youssef (2003). "Information and Communication Technology for SMEs in Egypt", SME Development Unit, Ministry of Foreign Trade. Online. <http://www.sme.gov.eg/webpubeng/ICT.pdf>
- Bridges.org. (2001). "Comparison of E-readiness Assessment Models". Online. <http://www.bridges.org/ereadiness/report.html>
- Bridges.org (2002). "E-Readiness Assessment: Who is Doing What and Where?". Online. <http://www.bridges.org/ereadiness/where.html>
- Buonanno, Giacomo, Stefano Gramignoli, et al. (2002). "ICT Diffusion and Strategic Role within Italian SME's". In *Global Perspective of Information Technology Management*. (Tan Felix: IRM Press)
- Cecchini, Simone and Talat Shah. (2002). "Information and Communication Technology As a Tool for Empowerment". *World Bank Empowerment Sourcebook: Tools and Practices*. April. Online. <http://www.cefe.net/forum/ICTtoolforempowerment.pdf>
- Center for International Development, Harvard University (2001-2; 2002-3). *Global Information Technology Report; Readiness for the Networked World* (2001-2002; and 2002-2003) Online. (<http://www.weforum.org/gitr>)
- Cloete, Eric (2003). "SMEs in South Africa: Acceptance and Adoption of E-Commerce". In *The Economic and Social Impacts of E-Commerce*, Sam Lubbe and Johanna Maria Van Heerden eds. IDEA Group Publishing.USA.
- Computer Systems Policy Projects. "The CSPP Readiness Guide for Living in the Networked World". Online. <http://www.cspp.org/projects/readiness/>
- Economist Intelligence Unit (2004). "Scandinavia consolidates lead in Fifth Annual Economist Intelligence Unit e-Readiness Rankings", Press Release, April 16, 2004. Online. http://www.store.eiu.com/index.asp?layout=pr_story&press_id=1260000726
- Economist Intelligence Unit (2003). "The 2003 E-readiness Rankings". Online.

http://graphics.eiu.com/files/ad_pdfs/eReady_2003.pdf

Economist Intelligence Unit (2002). "The 2002 E-readiness Rankings". Online.
[http://verdi.unisg.ch/org/idt/ceegov.nsf/0/dfa8e2bb51e1aaf2c1256df00030a3c5/\\$FILE/2002eReadAss.pdf](http://verdi.unisg.ch/org/idt/ceegov.nsf/0/dfa8e2bb51e1aaf2c1256df00030a3c5/$FILE/2002eReadAss.pdf)

Economist Intelligence Unit (2001). "The 2001 E-readiness Rankings". Online.
http://www.intelligentcommunity.org/art/pdf/E-Readiness_from_Economist.pdf

Friedrich Ebert Stiftung (1999). "The Internet for SME's in Egypt: Potential and Challenges" (Cairo: Friedrich Ebert Stiftung)

HC Brokerage (2002). "Egypt 2002: Global Collapse, Local Pains". Egypt Equity Research Country Report (Jan 3).

International Data Corporation and World Times (2000-2003). "Information Society Index". *World Paper* (2000, 2001, 2002, & 2003). Online:

<http://www.worldpaper.com/2000/Feb2000/isihi.html>

<http://www.worldpaper.com/2000/Feb2000/isirank.html>

<http://worldpaper.com/2001/xjan01/ISI/2001%20Isi%20in%20Brief.html>

<http://www.worldpaper.com/indexes/ISI/012002/TheWorldPaperISI2002.pdf>

<http://worldpaper.com/2003/oct02/isi2.html>

<http://worldpaper.com/2003/oct02/isi3.html>

IntraPairot, Arunee and Anongnart Srivihok (2003). The E-Commerce of SME's in Thailand. In *E-Commerce and Cultural Values*, Thanasankit Theerask, ed. (IDEA Group Publishing)

Kong, Wei-Chang (2003). "The Implementation of Electronic Commerce in SME's in Singapore". In *E-Commerce and Cultural Values*, Thanasankit Theerask, ed. (IDEA Group Publishing).

Lal, Kaushalesh (2001). "The Determinants of the Adoption of Information Technology: A Case Study of the Indian Garments Industry". In *Information, Technology, Productivity, Economic Growth*, Matti Pohjola, ed. (Oxford University Press).

MacGregor, R.C., and D.,J. Bunker (2000). "EDI and Small/Medium Enterprises". In *Electronic Commerce: Opportunities and Challenges*, Rahman, Syed and Mahesh Raisinghani eds. (IDEA Group Publishing).

McConnell International (2001). "Ready, Net, Go!" Online.
<http://www.mcconnellinternational.com/ereadiness/ereadinessreport2.htm>

McConnell International (2000). "Risk E-business: Seizing the Opportunity of Global E-Readiness" Online.
<http://www.mcconnellinternational.com/ereadiness/EReadinessReport.htm>

Meikle, Fiona, and Dianne Willis (2003). "E-Business Development Issues in UK SME's". In *Managing IT in Government, Business and Communities*, Ingrich, Gerry ed. (IRM Press)

Ministry of Foreign Trade, Egypt. "SME Statistical Information". Online.

http://www.sme.gov.eg/sme_statistical_information.htm

OECD (2000a). "Global Forum: Knowledge Economy and Digital Economy". Bologna Charter 2000. Online.

http://www.oecd.org/document/56/0,2340,en_2649_34619_1866232_1_1_1_1,00.html

OECD (2000b). "OECD Small and Medium Enterprise Outlook: Enterprise Industry and Services". 2000 Edition. Online.

http://www.ictmedsme.com/~contentseumedis/portada/encuesta/docs/OECD_SME.pdf

OECD (2000c). "Realizing the Potential of Electronic Commerce for SMEs in the Global Economy", Conference for Ministers responsible for SMEs and Industry Ministers, Bologna, Italy, 14-15 June 2000. Online

(http://www.conferenzabologna.ipi.it/Eng/dopo_la_conferenza/documenti/WK3_eng.pdf)

Pease, Wayne and Michelle Rowe (2003). "Issues Faced by Small and Medium Enterprises (SMEs) and their Take-up of E-Commerce in Australian Regional Communities". Online. <http://www.usq.edu.au/users/pease/publications/WebO3.pdf>

United Nations Conference on Trade and Development (2003). "Information and Communication Technology (ICT) Indices, 2003". Online.

http://www.unctad.org/en/docs/iteipc20031_en.pdf

United Nations Development Program (2002). "Today's Technological Transformations Creating the Network Age". *Human Development Report 2002*.

Online. <http://hdr.undp.org/reports/global/2001/en/pdf/chaptertwo.pdf>

Wolcott, Peter, Larry Press, Willian McHenry, Seymour Goodman and William Foster - Mosaic Group (2001). "A Framework for Assessing the Global Diffusion of the Internet". *Journal of the Association for Information Systems*. Online.

<http://jais.aisnet.org/articles/2-6/article.pdf>

World Bank (2001). "E-Readiness as a Tool for ICT Development". Online.

<http://www.infodev.org/library/WorkingPapers/AReready.pdf>