

## An Observational Study of Outdated Technology

A. Garnett\* and M.M. Bothma\*\*

*\*North-west University, PO Box 1174, Vanderbijlpark, 1900, South Africa*

*\*\*Vaal University of Technology, Private Bag X021, Vanderbijlpark, 1900, South Africa*

*Telephone: \*+27 16 910 3489; Fax: +27 18 293 5319; +27 16 950 9342*

*E-mail: \*[andregarnett@yahoo.com](mailto:andregarnett@yahoo.com); \*\*[marelizeb@vut.ac.za](mailto:marelizeb@vut.ac.za)*

**KEYWORDS** Paper Abuse. Faxing. Faxing. Paperless Office. Information Technology

**ABSTRACT** The use of paper-based approaches is still alarmingly prevalent in corporate environments. The objective of this paper is to explore paper usage in corporate and higher education institutions by observing the use of traditional technology versus electronic technology mechanisms. A mixed-mode methodology was utilised for collecting data, via an observational (n = 13) and quantitative survey (n = 123) method. Permission was obtained to observe participants at work, regarding their use of the fax machine in the administrative department at one Higher Education Institution (hereafter HEI) in South Africa. This was followed up by a survey among several business organisations, randomly sampled from the local business directory. The findings showed that paper abuse was being perpetuated and the paperless office is not a reality. Therefore policymakers in the organisations will have to mount campaigns to facilitate the use of electronic media, to rein in paper usage via training and awareness campaigns.

### INTRODUCTION

There has been an unprecedented pace of technological advancement over the last two decades, within the world we live and work in. As a result of technological advances, traditional jobs, working environments and cultures would have been expected to simultaneously change or advance.

The advent of such technologies were likely envisioned to enhance the effectiveness of the corporate working space, improve the efficiency of the workforce, and contribute to the sustainability of global resources, notwithstanding the elimination or decrease of the use of paper within the corporate working environment. Sustainability in business is becoming an increasingly critical factor in a world that is currently facing the threat of global warming (Dos Santos 2011). In reality, paper-based practices remain imbedded, as people still prefer to read off printed paper than from computer screens (Geske and Bellur 2008; Kelsey 2012) and owing to this, paper is often wasted, albeit inadvertently, in standard office practices.

One area of paper abuse we suspected within office environments in South Africa was linked to employees using the traditional fax machine rather than electronic faxing. Although electronic faxing has been available for some time, it appeared employees in organisations were not

making use of it. The benefits of electronic faxing (hereafter e-faxing) are numerous. E-faxing is located somewhere between e-mail and traditional faxing, and this attribute allows for great flexibility when it comes to the sending and receiving of faxes (Basauri 2009a b). With the advent of e-mail and multimedia applications, the transfer of data via the traditional fax machine has become outdated. The fax to e-mail and the combination of scan/fax to e-mail allows for the sending and receiving of documents from a computer and has numerous obvious benefits. For example, no limits are set to the number of faxes that can be received, it is paperless, inkless, more secure, and low cost (Bredell 2007a, b; Adams 2009; Mercado 2010; Allen 2012).

Furthermore, research was conducted in the United States of America (USA) on the utilisation of the fax machine and its impact on paper usage and the environment. These results were published in the Fax to e-mail guide (2012), which indicates that fax machines consume 200 billion pages of paper each year and that if only five percent of faxing was done online, one million trees could be saved each year. If this five percent used fax to email services, they could save 360 million gallons of water, save 215 million kilowatt hours of energy and eliminate three million pounds of air pollution.

Amid all the benefits associated with e-faxing it was confounding to think that employees

*\*Address for correspondence:  
Prof. A. Garnett*

would still make use of the traditional fax machine within their corporate office space, and yet we hypothesised that it was happening. Brain (2009) states that “*as long as faxing remains an essential part of doing business; every office will have a fax machine.*” Many traditional paper-based administrative environments still contain a fax machine. These environments operate mainly with paper documents, which eventually end up in folders, files or more often than not, in the waste bin.

### Objectives

The point of departure for this paper was consequently to:

- (1) Highlight the consequences of paper usage and wastage.
- (2) Compare traditional faxing mechanisms to the electronic version and the associated benefits thereof.
- (3) Set out to investigate and observe an environment in which traditional faxing is still being used to delineate the real paper usage.
- (4) Determine whether paper abuse was occurring in corporate workplaces
- (5) Establish whether we are any closer to realising the “paperless office”.

### Theoretical Background

With the introduction of every new technology into the workplace, there is often severe resistance to the usage of such, noted by early researchers such as Keen (1981). Much research has been conducted on the adoption patterns of information technology within organisations as well as extant models of resistance (Lapointe and Rivard 2005). They posit that in terms of resistance to technology, behaviour is the primary facet of resistance, as words like reaction (Ang and Pavri 1994), behavior (Markus 1983), and conduct (Zaltman and Duncan 1977) are found in almost all definitions. We argue that resistance is not so much based on behaviour as it is on processes and approaches used in organisations, also established by the work of Mahling et al. (1995) and Cooper and Molla (2010). Talebi and Way (2009) further denote that a truly paperless office is rarely attained, even as interest in green approaches has risen.

### Traditional Faxing versus Electronic Faxing

The digital fax machine is still regarded as an integral part of general office administration. Today, the fax machine has outgrown its usefulness due to competing Information and Communication Technologies (hereafter ICT) that include the Internet and online faxing (Kelsey 2012; Turner 2012). However, according to the Great Idea Finder website (2012), between 1973 and 1983, the number of fax machines in the USA alone increased from 30 000 to 300 000 and by 1989 the number had jumped to a staggering four million. Today by latest estimates, the number of fax machines in the USA is in excess of 17 million. Many any of these fax machines are still in operation today (The Information for Development Program 2012).

In a developed country like the United Kingdom (UK), that number is roughly 2,546 fax machines per 1,000 people or 1,579,581 fax machines. In a developing country like South Africa where the study was conducted, the latest estimate of fax machines is at around 104,066, which is arguably not that significant although substantially higher than their closest neighbour, Zimbabwe, which is listed as number 86 in the world with only an estimated 3,772 fax machines (The Information for Development Program 2012).

E-faxing allows an organisation to go paperless without draining its resources, since the documents received are already in electronic format and no paper is needed (Higgins 2011) and according to Sussman (2007), the inclusion of a fax-to-e-mail solution will assist in lowering the running costs of an organisation.

According to Caruana (2012) the *fax machine is slowly fading out but not before the end of this decade*. The author also states that with a recent survey of 7 000 LinkedIn users, on which office tools they think would disappear from the workplace by 2017, a total of 71 percent of the participants identified the fax machine.

## METHODS

### Research Design

An observational methodology was used in the initial research design. Such a direct observation technique allowed for a more systematic, structured process, by using observation record

forms (Kumar 1996). By physically observing the participants' use of the fax machine and recording the information by means of structured observation forms, it was possible to understand the extent to which it was being used and for what purpose, as well as the paper being utilised in the process.

In South Africa environments which are notorious for utilising large quantities of paper are universities and other HEIs. Therefore, in order to understand why HEIs still make use of traditional faxing (which could have been phased out long ago) instead of electronic faxing, we decided to conduct exploratory observational research and analyse the behaviour of participants in their work environment through merely observing their use of the traditional fax machine in a strictly administrative department at one large HEI in South Africa.

In addition, the researchers conducted a quantitative survey in the same HEI and several other business organisations to determine whether the findings from the observational study could be confirmed and how much paper was being utilised and/or wasted.

### Development of the Measuring Instrument

The measuring instrument in the fax observation process was first pilot tested for suitability, refined and then utilised in the main research design of the study. The research instrument was developed on the basis of previous research studies (Sellen and Harper 2002), who also used an exploratory, observational research approach. The researchers observed and documented information on faxes received, including the number of faxes and the number of pages per fax. These could include for example, general letters, deposit slips, and confirmation letters. In addition, they noted whether a cover page was included and whether the fax was utilised or destroyed after being received. Secondly, they recorded information on faxes that were sent by the employees, including the total number of faxes, the number of pages per fax, whether a cover page was utilised and whether the fax was filed after sending or destroyed. The researchers further recorded data on the total number of remittance advices received throughout the period of observation and finally observed and recorded data on the total number of photocopies made (via the fax machine).

The measuring instrument used in the quantitative, electronic survey was essentially a continuation of the data record used in the observation method, and solicited information on how respondents handled faxes, the way they faxed and whether they used cover pages or not during their sending and receiving of faxes.

### Sampling and Data Collection Method

A non-probability, purposive sample of 13 administrative employees from a Financial Aid Bureau in the finance department of one university in South Africa (hereafter Institution A) was used in the observational study. Institution A is a relatively large university in the Gauteng province, comprising approximately 19 000 students and 1 500 employees. Data were collected over a four-month period by observing 13 respondents' daily use of a traditional fax machine within the division where they were employed. The job description of all of the respondents was administrative in nature. The 13 participants observed were all female and ranged in age from 25 to 51 years.

The sample utilised in the quantitative survey portion of the study ( $n = 123$ ) were also employees at Institution A (randomly selected) as well as employees from seven large administrative type organisations, randomly drawn from a business directory list in the surrounding region. Organisations that participated in the study were those that gave prior approval for their employees to complete the survey and were the respondents to whom the self-administered questionnaire was eventually sent.

## RESULTS AND DISCUSSION

Table 1 summarises the results of the observation process at Institution A regarding faxes sent and received, both used and destroyed, remittance advices received, photocopies made and the number of pages involved.

Table 1 indicates the faxes *received* (covering pages not included) and indicates the percentage of faxes that were used/filed and those that were destroyed. The 1,778 faxes received comprised 3,056 pages. Once the faxes had been sorted, 1,822 (59.62%) were deemed useful and filed, whilst 1,234 (40.38%) were deemed unnecessary and subsequently destroyed.

**Table 1: Observational results**

| <i>Total faxes</i> | <i>Total pages</i> | <i>Faxes Received</i> |                       |                            |                                           |
|--------------------|--------------------|-----------------------|-----------------------|----------------------------|-------------------------------------------|
|                    |                    | <i>Covering page</i>  | <i>Fax pages used</i> | <i>Fax pages destroyed</i> | <i>Percentage fax pages destroyed (%)</i> |
| 1 778              | 3 056              | *239                  | 1 822                 | 1 234                      | 40.38                                     |
| <i>Faxes Sent</i>  |                    |                       |                       |                            |                                           |
| <i>Total faxes</i> | <i>Total pages</i> | <i>Covering page</i>  | <i>Fax pages used</i> | <i>Fax pages destroyed</i> | <i>Percentage fax pages destroyed (%)</i> |
| 970                | 3 402              | *582                  | 1452                  | 1 950                      | 57.32                                     |
| <i>General</i>     |                    |                       |                       |                            |                                           |
| <i>Remittance</i>  | <i>Photocopies</i> |                       |                       |                            |                                           |
| <i>advice</i>      | <i>made</i>        |                       |                       |                            |                                           |
| 1 281              | 10 115             |                       |                       |                            |                                           |

\*This total is not included in faxes used and destroyed

Most faxes received were related to payment queries. These faxes consisted of deposit slips, confirmation letters, claim forms and general correspondence. During further investigation on the process flow, using semi-structured questions, the following was determined: (1) companies still fax proof of payments through even though they have already done an electronic transfer into Institution A's bank account using a reference number; (2) companies submit original confirmation letters (personally) and fax the copies through (3) copies of refunded application forms and requests were e-mailed and faxed.

According to Table 1, 970 faxes were sent, of which 21 percent had covering pages. There was a discrepancy of 311 pages between the 1,281 remittance advice documents recorded and the actual number of faxes sent. It was found after investigation that the fax/copier machine observed was programmed to print out a remittance advice for each fax sent as well as an additional remittance advice for each destination line that was initially engaged. In other words, in the event of a fax being sent and the line being engaged at the receiver's end, a remittance advice is printed, indicating that the fax was pending and did not go through. Only after the fax had successfully been sent was a remittance advice with an 'OK' message printed. It was also possible that a fax error could have occurred during the sending process and a remittance advice would again be printed, indicating the specific error that had occurred. It was further found that fax reports are printed after every 30 faxes sent. This again increased the number of unnecessary pages printed.

The 970 faxes that were sent consisted of 3,402 pages, of which 1,452 pages (42.68%)

were filed and 1,950 pages (57.32%) were destroyed. Effectively, 57 percent of the faxes sent had no value after they were sent. The investigation showed that most faxes sent were to clients outside of the institution and consisted of invoices and quotations. It was also found that these clients had requested the information. However, copies were unacceptable for purposes of payment of an account. During this investigation, it was observed that once a certain period had elapsed after the sending of invoices and quotations, hard copies were printed (again on letterheads) and posted to these clients for first, second or third payments. It was found that the main purpose of faxing an invoice in the first place was to update the client of the status of their credit account, and not for payment purposes, which could be considered as wasteful and unnecessary.

### Photocopies Made by Respondents

Concerning photocopying, 10 115 black and white photocopies were made. These copies mostly included the copying of information for reports, attachments for journals or approvals, as well as the photocopying of different application forms for refunds. The impact of photocopying application forms and journals somewhat increases the use/abuse of paper.

During the investigation of the organisation's process flow, it should be noted that the following processes contributed to the paper wastage in the organisation:

**(1) Photocopying of Student Application Forms by Respondents:** In-house forms were designed according to the different criteria needed from the applicant. These forms were

then printed from the system and copies were made. For this task, it should be noted that the department under observation had already made copies of the forms, and additional copies were required due to forms being incorrectly filled-in, or misplaced.

### (2) *Attachments to Journals or Approvals:*

A variety of documents had to be attached to journals and other documents, which were handed in during the application process. For example, for each application in the bursary department at the HEI it was found that an average of five pages of information was generally attached to a refund application or journal. Paper abuse was evident during this process. Photocopies were made of application forms, confirmation letters from sponsors and other documentation for approval. The main point of concern noted during the observational process was the five copies of documents that were required per applicant for approval purposes. This procedure of application forms to be completed for approval (refunds) indicates a system that is not cost effective.

These results both echo and refute those of a study conducted by Herschler and Slany (1982) who outlined the transformation of the processes of the State Department's Foreign Affairs Information System to a paperless system. They then found that this was beneficial and feasible, and eliminated vast amounts of paper wastage. So indeed, even thirty years ago, the "paperless office" was a possibility. However, they found that the largest obstacle was *an outmoded reluctance of Department historians and other officials* which hampered the implementation of the system. Our findings similarly showed that although electronic media is available, there is a reluctance to move toward using it, and employees are more comfortable with "the way we have always done it".

## Findings from the Quantitative Survey

The respondents had an option to select more than one answer from the structured questionnaire. When considering these figures in Table 2, it is significant to note that, 69.11 percent (more than half) of the sample still utilises the traditional fax machine. This implies that these 69.11 percent add to the problem of unnecessary paper use and paper abuse. Only 47.15 percent of the sample makes use of the free service

of fax-to-e-mail in a receiving capacity whereas one would have expected that due to the almost zero cost involved, most employees would make use of the fax-to-email service.

**Table 2: Method for sending and receiving faxes by respondents**

| Method                   | Valid (n) | Valid percentage (%) |
|--------------------------|-----------|----------------------|
| Traditional fax machine  | 85        | 69.11                |
| Fax-to-email (Receiving) | 58        | 47.15                |
| PC to Fax (Sending)      | 24        | 19.51                |
| Total                    | 123       | 135.77               |

Only 19.51 percent indicated making use of a personal computer (PC) to send faxes. Bearing in mind that PC to fax has a minimal cost implication, in today's contemporary business world where advanced ICT systems are available, the above results are a matter of great concern, not only with regards to excessive paper usage but also as far as underlying costs are concerned. We infer that the above practice is due to the continued availability of traditional machinery as well as a lack of training and development of employees in the use of modern technology.

Table 3 reports on the respondents' use of cover pages when faxing documents. These results are alarming when considering the unnecessary paper utilisation taking place. A full page is not needed for noting down to whom you are sending the fax and from whom it originates. A cover page is not only a waste of paper but ultimately takes time to prepare and incurs unnecessary printing costs. Since the recipient's name as addressee is typically written on the first page of a fax and the sender is quoted (if not officially signed), it can be concluded that a cover page is unnecessary. This wastage requires urgent attention.

**Table 3: Inclusion of cover pages by respondents on faxes**

| Response | Valid (n) | Valid percentage (%) |
|----------|-----------|----------------------|
| Yes      | 101       | 82.79                |
| No       | 21        | 17.21                |
| Total    | 122/123   | 100.00               |

Table 4 reports on the ways in which respondents disposed of traditionally faxed documents. A cumulative 46.33 percent of the respondents

saw no value in keeping the faxes, either destroying them, throwing them away, leaving them at the fax machine, shredding them or recycling them. This raises the concern of why the faxes were then printed in the first place and why alternative methods of communication such as e-mail could not have been used.

**Table 4: Handling of traditional faxed document(s) by respondents**

| <i>Handling of traditional fax</i>                                       | <i>Valid (n)</i> | <i>Valid percentage (%)</i> |
|--------------------------------------------------------------------------|------------------|-----------------------------|
| File the fax in a folder or file                                         | 61               | 49.59                       |
| Keep the fax as reference for a short period of time and then destroy it | 48               | 39.02                       |
| Place the fax in the dustbin                                             | 1                | 0.81                        |
| Leave the fax at the fax machine                                         | 1                | 0.81                        |
| Destroy the fax by shredding it                                          | 3                | 2.44                        |
| Place the fax in a recycle bin for recycling                             | 4                | 3.25                        |
| Not applicable                                                           | 5                | 4.07                        |
| Total                                                                    | 123              | 100.00                      |

Table 5 reports on the ways in which respondents in the sample dispose of electronically faxed documents. The results reported in Table 5 imply that the majority of the respondents are duplicating tasks by saving the faxes electronically and then printing a hard copy to be filed. This results in the abuse of equipment, paper, printing costs, files/folders and unnecessary floor space for cabinets to hold the documents.

**Table 5: Handling of e-faxes by respondents**

| <i>Handling of e-fax</i>                                             | <i>Valid (n)</i> | <i>Valid percentage (%)</i> |
|----------------------------------------------------------------------|------------------|-----------------------------|
| Save information electronically                                      | 35               | 28.69                       |
| Save information electronically and print hard copy to place in file | 51               | 41.80                       |
| Do not save or file the information                                  | 8                | 6.56                        |
| Not applicable                                                       | 28               | 22.95                       |
| Total                                                                | 122 / 123        | 100.00                      |

Table 6 reports on the number of pages respondents in the sample typically sent per week using traditional faxing. Table 6 illustrates that internal department functions and procedures differ in terms of the frequency of the need to communicate via traditional faxing, but overall

the respondents send a large number of faxes per week by means of a traditional fax machine. Only 4.88 percent of the respondents do not use a paper-based method of faxing.

**Table 6: Total faxes sent: Traditional faxing by respondents**

| <i>Traditional faxes sent per week</i>  | <i>Valid (n)</i> | <i>Valid percentage (%)</i> |
|-----------------------------------------|------------------|-----------------------------|
| 1-5 per week                            | 52               | 42.28                       |
| 6-10 per week                           | 24               | 19.51                       |
| 11-15 per week                          | 18               | 14.63                       |
| More than 16 per week                   | 23               | 18.70                       |
| Do not use paper-based method of faxing | 6                | 4.88                        |
| Total                                   | 123              | 100.00                      |

Table 7 reports on the number of documents respondents typically sent per week using electronic faxing. Although a reasonable number of electronic faxes are sent in a week, it is of great concern to note that 31.15 percent do not make use of e-faxing at all, considering that it is freely available via a computer, which is paramount in almost every office environment today. This indicates that there is a lack of interest (or resistance to change) to move towards paperless electronic communication and away from paper-based systems by effectively using electronic equipment, again reminiscent of the findings noted by Herschler and Slany (1982).

**Table 7: Total faxes sent per week: Electronically**

| <i>e-faxes sent per week</i>                   | <i>Valid (n)</i> | <i>Valid percentage (%)</i> |
|------------------------------------------------|------------------|-----------------------------|
| 1-5 per week                                   | 44               | 36.07                       |
| 6-10 per week                                  | 19               | 15.57                       |
| 11-15 per week                                 | 10               | 8.19                        |
| More than 16 per week                          | 11               | 9.02                        |
| Do not make use of electronic method of faxing | 38               | 31.15                       |
| Total                                          | 122 / 123        | 100.00                      |

The findings indicate that paper usage is very prevalent, as well as wastage thereof. It is worthy of note that in a study by Dziejewit et al. (1989), they found that the business world almost exclusively relies on the generation of paper to conduct business transactions and run day-to-day operations. After more than two decades, our findings concur with theirs, in that very little has changed in the office, and paper remains firmly entrenched.

The findings show that paper use is very high and in most cases unnecessary. This is consistent with a study conducted by Gupta et al. (2011), which highlighted the significant paper use among university students. Owing to the fact that students will become future employees, it is feasible to assume that their behaviour will be perpetuated within their respective, eventual workplaces. Given these findings, it is unlikely that Caruana's (2012) predictions that the fax machine will phase out by the end of the decade, will be realised.

### CONCLUSION

This study outlined the use of different fax systems in a HEI environment, as well as in several other business environments. It is evident that paper abuse is present in all aspects of traditional faxing and is prevalent among the organisations surveyed in the study. As, of all the faxes received and sent and photocopies made, more than half of the documentation was destroyed in the process, which raises the question of why it was necessary to print it in the first place. In terms of the cost implications, traditional faxing is certainly more expensive than e-faxing and environmentally, has a vast impact when one takes cognisance of how much paper is actually wasted in the process. It is apparent that e-faxing is overall the best way to forward documents, but this will require somewhat of a mindset (and process) change for both employer and employee. In the last three decades, there has been an endeavour towards the "paperless office", and yet it seems that in many respects we are no closer to attaining this.

### RECOMMENDATIONS

The obvious recommendation is that traditional fax machines be "forcibly" removed from administrative environments, which would eliminate much of the unnecessary wastage of paper observed in the study. However, should it not be possible to entirely eliminate traditional fax machines from an environment, the following recommendations could be pivotal in minimising or eliminating the abuse of paper and streamlining employee work processes:

(1) No cover pages should be used, instead fax-post-its should be utilised. (2) All traditional fax machines should be programmed not to print

remittance advices; instead an OK digital message after a fax was transmitted. (3) In circumstances where old traditional fax machines are still in use, the free fax to e-mail service should be promoted and implemented. This free service will save on paper, ink cartridges, toner and maintenance. (4) Regarding electronic communication, all employees involved, should go through a compulsory training session regularly. (5) It should be mandatory for all systems and processes to be closely monitored and corrective actions taken where necessary. (6) A method should be implemented by management to control and calculate the usage of paper by means of policies and procedures. This should be monitored, maintained and upgraded regularly. Where possible, application forms should be electronic and not paper-based. (7) Any organisation should have a "green" corporate awareness campaign to curb the abuse of paper. (8) Staying abreast with technology is imperative and is therefore highly recommended that e-faxing be implemented at all costs.

### FURTHER RESEARCH

As this exploratory study merely aimed to paint a general picture of the use of faxing methods and paper usage in office environments in South Africa, it is recommended that future research could focus on other administrative and corporate environments to determine whether similar phenomena are occurring. The researchers caution that their results cannot be generalized necessarily to other environments. It would also be helpful to focus on high technology corporate environments to compare traditional, notorious paper-based environments to what are supposed to be the virtual offices of the future in highly technological corporate environments. A comparative study between South Africa and perhaps a more developed country may also be of interest to determine whether the adoption patterns of traditional faxing versus e-faxing are similar.

It is highly likely that paper abuse is far more common than one would have thought in many other environments and that the "paperless office" still eludes us.

### REFERENCES

Adams S 2009. Document Management and the Raiders of the Lost Fax. Home Office Weekly. From <<http://>

- www.homeofficeweekly.com/office-space/document-management.html> (Retrieved March 24, 2009).
- Allen J 2012. Understanding Online Fax Service. From <<http://www.selfgrowth.com/articles/understanding-online-fax-service>> (Retrieved October 23, 2012).
- Ang J, Pavri F 1994. A survey and critique of the impacts of information technology. *Int J Info Man*, 1(2): 122-133.
- Basauri P 2009a. Free Electronic Fax. Ezine@rticles. From <<http://ezinearticles.com/?Free-Electronic-Fax&id=1605868>> (Retrieved March 24, 2009).
- Basauri P 2009b. How to Fax Without a Fax Machine. Articlesbase. From <<http://www.articlebase.com/print/770535>> (Retrieved March 24, 2009).
- Brain M 2009. How Fax Machines Work. Howstuffworks. From <<http://communication.howstuffworks.com/fax-machines.htm>> (Retrieved 24 March 2009).
- Bredell W 2007a. Channelling Your Fax Through to E-mail Makes Sense. ITWeb. From <<http://www.itweb.co.za/sections/quickprint/print.asp?StoryID=177908>> (Retrieved October 5, 2007).
- Bredell W 2007b. Faxing Your Way to a Paperless, Eco-friendly Office. ITWeb. From <<http://www.itweb.co.za/sections/techforum/2007/0710170806.asp?S=Digital%20Office%20>> (Retrieved October 24, 2007).
- Caruana A 2012. Giving Up Your Fax Machine For Good. From <<http://www.bit.com.au/Tools/Print.aspx?CIID=319731>> (Retrieved October 22, 2012).
- Cooper V, Molla A 2010. Conceptualizing Green IT Organizational Learning. *Green IT Working Paper Series*, RMIT University, Australia 3: 1-12.
- Dos Santos MAO 2011. Minimizing the business impact on the natural environment. *Eur Bus Rev*, 23(4): 384-391.
- Dziewit HS, Graziano JM, Daley CJ 1989. The quest for the paperless office electronic contracting: State of the art possibility but legal impossibility. *Santa Clara High Tech L J*, 5(1): 75-97.
- Geske J, Bellur S 2008. Differences in brain information processing between print and computer screens: bottom-up and top-down attention factors. *Int J Adv*, 27(3): 399-423.
- Gupta P, Matulich E, Yalabik B 2011. Printing on paper: Costly nuisance or pedagogical imperative? *Amer J Bus Educ*, 4(9): 31-36.
- Herschler DH, Slany WZ 1982. The "Paperless Office": A case study of the state department's foreign affairs information system. *Amer Archivist*, 45(2): 142-154.
- Higgins J 2011. How Much Money Green Papers Save Businesses. From <<http://blog.metrofax.com/how-much-money-green-papers-save-businesses/>> (Retrieved October 22, 2012).
- Information for Development Program 2012. Fax Machines by Country. From <[http://www.nationmaster.com/graph/med\\_fax\\_mac-media-faxmachineandint=-1](http://www.nationmaster.com/graph/med_fax_mac-media-faxmachineandint=-1)> (Retrieved October 27, 2012).
- Keen PGW 1981. Information systems and organizational change. *Comm ACM*, 24(1): 24-33.
- Kelsey E 2012. How Internet Faxing Benefits Businesses. From <<http://www.patlive.com/business-center/how-internet-faxing-benefits-businesses/>> (Retrieved October 21, 2012).
- Kumar K 1996. Performance Monitoring and Evaluation TIPS. *USAID Centre for Development Information and Evaluation Volume No. 5*. Washington: USAID.
- Lapointe L, Rivard S 2005. A multilevel model of resistance to information technology implementation. *MIS Quart*, 29(3): 461-491.
- Mahling DE, Craven N, Croft WB 1995. From office automation to intelligent workflow systems. *IEEE Expert*, 10(3): 41-47.
- Markus ML 1983. Power, politics and MIS implementation. *Comm ACM*, 26(6): 430-444.
- Mercado K 2010. Advantages of E-fax Over Paper Fax Machines and Available Public Fax Services. From <<http://ezinearticles.com/?Advantages-Of-E-Fax-Over-Paper-Fax-Machines-And-Availabl>> (Retrieved October 23, 2012).
- Sellen AJ, Harper HR 2002. *The Myth of the Paperless Office*. Cambridge: MIT Press.
- Sussman R 2007. Technology as a Managed Service can be Effective. ITWeb. From <<http://www.itweb.co.za/sections/quickprint/print.asp?StoryID=169709>> (Retrieved October 4, 2007).
- Official Homepage of Fax to email guide 2012. Internet Fax Advantages. From <<http://www.faxtoemailguide.com/internet-fax-guide/fax-advantages>> (Retrieved October 22, 2012).
- Official Homepage of the Great Idea Finder 2012. Fax Machine. From <<http://www.ideafinder.com/history/inventions/fax.htm>> (Retrieved October 27, 2012).
- Talebi M, Way T 2009. Methods, metrics and motivation for a green computer science program. *SIGCSE Bull*, 41(1): 362-366.
- Turner A 2012. How to Bring your Business Fax into the Internet Age. From <<http://www.bit.com.au/Tools/Print.aspx?CIID=316666>> (Retrieved October 22, 2012).
- Zaltman G, Duncan R 1977. *Strategies for Planned Change*. New York: John Wiley and Sons.