
Cost analysis and the effective management of records throughout their life cycle

Patrick Ngulube (PhD)

University of South Africa (School of Graduate Studies), Pretoria, South Africa

ngulup@unisa.ac.za

Abstract

The article deals with the concept of cost analysis in the context of managing records throughout their life cycle. Ways of cost saving or avoidance in managing records are covered. Document management strategies have the potential to provide some substantial cost – saving benefits if they are used judiciously. The document management strategies covered by the article include paper, micrographics and electronic formats. Audio-visual records are not given any special treatment because they are part of these formats. The article demonstrates through the literature review that cost analysis is an essential part of planning records management programmes and making informed decisions about costs and benefits that may accrue to an organisation that desires to have a competitive edge. The argument is that cost benefit analysis may be employed as a powerful tool for determining and assigning costs and benefits, identifying all alternatives and specifying the critical characteristics demanded by a records management system.

Keywords: Benefit cost analysis, document management, record formats, record life cycle, records management

1 Introduction

Every business is involved in the production of records in its processes. Therefore, records management is one of the by-products of business processes. The basis of records and information management are the traditional three Es, namely economy, efficiency and effectiveness. This traditional approach to records and information management has been greatly challenged by the evolution of document management strategies that have been largely driven by technology (Pen, Pennix & Coulson 1994; Ricks, Swafford & Gow 1992; Shepherd & Yeo 2003; Tough & Moss 2003). Records management technologies have evolved from paper to microfilm through to digital and optical objects. Records managers are called upon to manage their information in the midst of all these challenges and diminishing resources. At times they find themselves in an invidious position of having to choose the best records management solutions from competing alternatives. Understanding the benefits and costs of each records management solution is crucial to the success of any records management strategy. Cost analysis is an essential tool for planning records management programmes and making informed decisions about costs and benefits that may accrue to an organisation that desires to have a competitive edge having an effective and efficient system.

Arguably, cost benefit analysis of records management solutions does not seem to be a major concern to many records managers, especially in sub Saharan Africa. Many scholars have expressed disappointment over the state of records management in SSA (Akotia 2003; Akussah 2002; Harper 2004; Kemoni, Ngulube & Stilwell, 2007; Kenosi 1999; Ndenje-Sichalwe & Ngulube 2009; Mnjama 2003; 2005; Ngoepe 2009; Ngulube & Tafor 2006; Wamukoya 2000). They have revealed that many records offices operate as “records warehouses” instead of being records management offices where records are systematically controlled from creation to their final disposal through archiving or destruction.

It is not uncommon to see records that do not support current operations clog the records offices. Duplicate copies of records are kept in expensive office accommodation and equipment. Some records managers do not have guidelines regarding records retention. Some are wary of any storage outside their own offices. Filing cabinets are full of records of unknown value. Some records are stored in basements where there are water leakages. Some unusable records that have been destroyed by water or termites are kept in expensive file cabinets and office space. Too many records are kept for too long because organisations do not have robust disposal policies. Some departments have records stored at offsite record storage areas that they are unaware of their existence. Records management processes are fragmented. Records managers in many offices are passive and they do not market themselves and the service they offer. Problematic personnel, especially administration officers and clerks are “recycled” into records management roles. In many organisations, records management is not recognised as a specific corporate function. These experiences are not confined to sub Saharan Africa.

A study by Zettek (2005) in the United States of America uncovered similar problems at the City of Rochester in the State of New York. Many scholars recognise that keeping records that the organisation does not need wastes space, time and energy (Chinyemba & Ngulube 2005; Eastwood 2006; Mnjama 1996; Ngoaketsi 2003; Ngulube & Tafor 2006; Ricks Swafford & Gow 1992; Shepherd & Yeo 2003; Smith 2007; Tough & Moss 2003; Wamukoya 2000). The challenges outlined in the foregoing paragraphs may be partly solved by implementing cost effective document management strategies and having the appropriately skilled records management personnel. Cost effectiveness can be achieved through benefit analysis. Cost benefit analysis (CBA) or benefit cost analysis (BCA) may assist record managers to determine how expected benefits outweigh the expected investment and the expected risks.

2 Changes in document management is none of our concern so says some records managers

The changes in documents management strategies should be a concern to information professionals, particularly records managers because nowadays understanding these changes is fundamental to managing records throughout their life cycle in a proper and efficient manner. The concern with changes in document management formats and approaches have been stimulated by technological and political forces. The tools of handling records have evolved from formats such as clay and stone tablets, paper, micrographics through to electronic ones. Changes in technology offer huge potential benefits to records management activities. Records managers must embrace these changes and recognise their merits and demerits, otherwise they will become irrelevant. For instance, if records fail to think of managing their records in an electronic way, the information technology professionals will take over their responsibility (Tough & Moss 2003). On the political front the driving forces in building effective and efficient records management systems and procedures are the freedom of information and data protection legislation and e-government initiatives.

Understanding various document management approaches may help records managers to manage records throughout their life cycle in a cost effective way. In that way records will remain accessible, usable, secure, reliable and authentic. As corporate resources driving the knowledge economy and the information society, records help organisations to (Akotia 2003; Akussah 2002; Chachage & Ngulube 2006; Chinyemba & Ngulube 2005; Eastwood 2006; Kemoni, Ngulube & Stilwell 2007; Kenosi 1999; Makhura & Ngoepe 2006; McKemmish,

Reed & Piggott 2005; Ndenje-Sichalwe & Ngulube 2009; Mnjama 2005; Myburgh 2005; Ngoaketsi 2003; Ngoepe 2004; Ngulube 2004; Ngulube & Tafor 2006; Pen, Pennix & Coulson 1994; Ricks, Swafford & Gow 1992; Shepherd & Yeo 2003; Tough & Moss 2003; Wamukoya 2000):

- function and reduce operating costs;
- support better decision making;
- protect the rights of stakeholders;
- comply with legislation and regulations (for instance tax, company, health and safety, promotion of access to information, and customs and excise);
- avoid paying unnecessary fines and lawsuit settlements costs;
- provide evidence of transparency and accountability;
- contribute to organizational efficiency;
- foster good governance;
- increase productivity and individual accountability;
- manage risks; and
- Preserve corporate memory.

Properly managed records may meet some of the requirements outlined above. The efficient management of records largely hinges on employing various document management strategies. Implementing a sound document management strategy means that (ALOS Micrographic Corporation 2009; Smith 2007):

- file cabinets will not be needlessly overflowing with records;
- no files will lie around and gather dust in offices;
- less time will be spent searching through many files;
- all the files will be found when needed;
- office space and equipment will not be used in an uncreative manner;
- maximum security of records will be achieved; and
- costs will be reduced drastically.

Although there are anecdotal reports confirming that document managing strategies provide financial benefits by helping to reduce costs and improve revenue, few cost-benefit analyses have been reported in the literature. Implementing of any document management strategy should be undertaken after a thoughtful analysis of the cost and benefits involved. Cost benefit analysis can assist in assessing the costs and benefits of each document management scheme. We need to discuss the merits and demerits of each document management approach before we delve into the costs and benefit analysis discourse in the subsequent sections.

3 Document management strategies and the management of records

The major document management strategies that are discussed in the literature are paper, micrographics and electronic formats (Williams 2006; Ngulube 2002; Pen, Pennix & Coulson 1994; Ricks, Swafford & Gow 1992; Robek, Brown & Stephens 1995; Saffady 1996, 2000, 2003; Tough & Moss 2006). The strategies provide effective means of controlling access and retrieval of records. Document imaging which encompasses software – based computer systems that capture, store and reprint images is beyond the scope of this discussion. Document imaging is a documents management tool that may facilitate the integration of the various document management strategies described in this section. It should be seen in the same light as electronic document management systems. Document imaging may be part and parcel of a suite of tools that may be used to capture, manage, store, preserve and deliver content and

documents to support business processes or it may be viewed as an enterprise content management (ECM) (Association for Information and Image Management 2008).

In that case, the discussion of document management systems such as DocuShare®, Documentum®, eFileCabinet®, ImagePlus®, Hummingbird®, Open Text ECM Suite®, SharePoint®, TRIM Context®, Universal Content Management® which are proprietary systems, and Open Source systems such as Alfresco, Archivista, Knowledge Tree, Nuxeo and OpenKM is equally beyond the scope of this discussion. The aim of this paper is to show that there are a number of document management strategies that can be used to effectively manage records throughout their life cycle in cost effective way rather than dealing with the specific details pertaining to documents management. In any case documents management systems mainly deal with electronic formats, which is one of the key issues that this article discusses. Having made that disclaimer, we now turn to the merits and demerits of various document management strategies, starting with paper followed by micrographics and then ending with electronic formats.

3.1 Advantages and disadvantages of paper formats

Some of the advantages of paper formats are (Alaska State Archives 2009; Williams 2006; Grills 1979; Huth 2003; Kentucky Department for Libraries and Archives 2007; Oregon State Archives 1994; Saffady 1996, 2000, 2003; Sumners 2007; Utah State Archives and Records Service 2009; Western Micrographics and Imaging Systems 2008; Wisconsin Historical Society 2009):

- is a familiar, convenient reference medium;
- does not require hardware or software for reference;
- legally admissible in a court of law;
- long – term storage medium;
- does not require migration; and
- can be read without any technical aids.

Many users feel comfortable with paper-based records but there are a number of disadvantages to paper based systems (Gillies 2009). The major disadvantage of paper formats is that they may cause delays in conducting business, poor customer service, trailing behind competitors and losing revenue and profit (Alternative Micrographics [nd]). Paper documents have to be removed from shelves or file drawers to disseminate information they contain. Their distribution may entail carrying, mailing, trucking or otherwise transporting bulky, cumbersome material at appreciable effort and expense to the users. The other disadvantages of paper formats are:

- security not in-built into the records;
- responding to the Freedom of Information requests, for instance, can be cumbersome (retrieving documents and photocopying, thus increasing wear and tear);
- retrieval is time consuming;
- more staff time is required for retrieval of records;
- possibility of unnecessary duplication of records in storage;
- can be misfiled or lost;
- subject to wear and tear;
- considerable expenditures on personnel and space;
- difficult to transmit, and methods such as fax are very insecure;
- can only be sorted one way at a time; and

-
- data sharing is complicated and cumbersome.

Changing the format of paper documents to microfilm or digital can help an organisation to maximize storage space and make records easier to access by multiple users as outline below.

3.2 Advantages and disadvantages of micrographic formats

Microforms include microfilm, microfiche, aperture cards and storage jackets. Micrographics may be characterised as a series of activities which record reduced images of documents, called micro-images, onto fine grain, high resolution photographic film in a manner that ensures their reproduction, retrieval, and preservation (Alaska State Archives 2009; Kentucky Department for Libraries and Archives 2007; Oregon State Archives 1994). The advantages of microfilm are well documented in the literature (Alaska State Archives 2009; Alternative Micrographics [nd]; Williams 2006; Grills 1979; Huth 2003; Kentucky Department for Libraries and Archives 2007; Oregon State Archives 1994; Saffady 1996; 2000; 2003; Summers 2007; Utah State Archives and Records Service 2009; Western Micrographics and Imaging Systems 2008; Wisconsin Historical Society 2009; Wolfinger 1994). In order to use micrographics in the modern information management environment, one needs viewers, scanning equipment and digital film. As a more cost effective format than paper, micrographics can provide many advantages and benefits as outlined below:

- is a mature technology (tried, reliable, predictable if stored correctly);
- computer output microfilm (COM) can be interfaced easily with electronic systems (production of micro-images on film from digitally files);
- microfilm can be created from digital files using an Archive Writer technology, for instance;
- capturing images from paper onto microfilm is very fast and inexpensive;
- secure (records may be duplicated and stored in secure off-site storage, allowing recovery and retrieval of information in case of loss, theft, or damage);
- provides a 'human readable' disaster backup for vital records;
- file integrity is assured (documents remain in fixed locations on the film as they are stored sequentially, eliminating the possibility of misfiling or alteration);
- storage savings (requires about 2 per cent of the space required to store the equivalent documents in paper format as one roll of film may contain as many as 3,000 documents; other savings can be made in file equipment and storage costs as well);
- duplication and distribution (cheaper to duplicate and distribute than the equivalent paper records);
- retrieval (automated or manually indexed microfilmed records can be quickly and accurately retrieved);
- ability to render an exact, optical facsimile of subtle details;
- Proven technology with established standards that assure media quality and stability for preservation of long-term records;
- long – term storage of information (kept in environmentally controlled conditions, microfilm can remain stable for over two hundred years);
- microfilm is not likely to be obsolete because it can be read by the naked eye using only light and magnification;
- relatively inexpensive; and
- recognised archival medium.

Microfilm is cost effective than paper for the long – term storage of records. It is not cost-efficient to microfilm records which will be retained for less than ten years because microfilm costs are likely to far exceed storage costs for a short period. Records with retention periods of more than 20 years are the best candidates for microfilming. Records without retention periods should never be microfilmed. Scarce resources might be wasted on information of no value.

Micrographics have certain limitations. Vendor portrayals of micrographic systems and its possibilities have been, at times, overly simplistic and misleading. Microfilm has disadvantages that include (Alaska State Archives 2009; Alternative Micrographics [nd]; Williams 2006; Grills 1979; Huth 2003; Kentucky Department for Libraries and Archives 2007; Oregon State Archives 1994; Saffady 1996, 2000, 2003; Sumners 2007; Utah State Archives and Records Service 2009):

- computer output microfilm (COM) is more expensive than optical disk storage;
- retrieval is time consuming (sequential medium requiring sequential retrieval);
- more staff time is required for retrieval of records;
- more staff time is required for prepping for microfilm (eg removing staples, paper clips and bindings, flattening);
- delays, mechanical breakdown;
- quality control problems; and
- instability of the medium (humidity and temperature of storage places should be monitored at all times).

It is important to conclude this section by pointing out that some of the disadvantages of microfilming are diminishing as micrographics hardware and software is improving. Consequently, the cost of microfilming and creating digital objects is becoming roughly the same (Kenney 2002; Willis 1992).

3.3 Advantages and disadvantages of electronic formats

Application of information technology has been identified in the literature as one of the major ways of improving records management activities (Saffady 2003; Tsai & Bond 2008). The advent of information technology has introduced enormous potential for the management of information and records. For instance, the storage and retrieval of large amounts of information where quick, accurate access is essential is now possible. Information technology is replacing or superseding paper systems in many areas, and can complement or supplement micrographics systems. Even though the investment in electronic records systems may at first be costly, most argue that over time this outset cost will result in greater savings for records users and the organisation. The advantages of electronic formats are well documented in the literature. Some of the advantages of having business records available in electronic formats are as follows (ALOS Micrographic Corporation 2009; Gillies 2009; Grigsby 1985; Smith 2007; Tsai & Bond 2008; Willis 1992):

- offer superior references functionality of current records;
- paper – handling and error – prone processes are reduced;
- increase communication between users;
- cannot be damaged by use;
- compact and can be backed up readily to protect from damage from water, tear, fire and water;
- faster access to information (saves time);

- can be sorted any number of ways;
- retrieval is instantaneous;
- simple to transmit, and provide inbuilt protection methods such as encryption;
- reduce records retrieval efforts;
- excellent transmission and distribution capabilities;
- freeing up records storage space;
- improved control over information management processes;
- electronic data can be accessed online from a secure Internet – based server 24/7;
- can convert other formats quickly through integrating multifunctional devices (ie digital scanner input, word and text processing input and graphic image storage can be managed simultaneously);
- departments can be integrated easily (facilitate data sharing across multiple departments and business processes);
- security can be made part and parcel of the selected database selected and there is no need of customizing security all the time.

On the other hand, they have the following disadvantages (Alaska State Archives 2009; Williams 2006; Grills 1979; Huth 2003):

- technology is fairly new and rapidly evolving;
- some electronic documents are very sensitive to climate;
- converting other formats through scanning, imaging and data conversion through optical and intelligent character recognition (OCR and ICR) can be costly;
- procedures and standards for digitization are still evolving and they are lacking in many areas;
- not acceptable in some countries as a legal substitute for the original, especially in sub Saharan Africa;
- digital storage is not considered archival;
- the drive systems become obsolete over time;
- ease of transmission of electronic data can pose a threat to confidentiality; and
- although looking after electronic records is facilitated by the technology, many users do not do it, leaving records vulnerable.

3.4 Hybrid systems or mixed media approach

The hybrid concept is not new to the field of information management (Chapman, Conway & Kenney 1999; Willis 1992; Tough & Moss 2003). The term “hybrid” is often used to describe activities that combine two established features (Oppenheim & Smithson 1999). Each document management strategy has different costs and benefits. The strength of one document management strategy compliments the limitations of the other (Saffady 2003). By taking advantage of the strength of each document management strategy a system that meet specific life cycle requirements in the most economical manner can be designed. Micrographic and electronic formats do not render paper obsolete, but they certainly do reduce needed paper significantly. A hybrid approach that relies heavily on tapping into the advantages of paper, microfilming and electronic formats may offer the best records management solution in a cost effective manner. For instance, an electronic record may be used to enhance access, and use microfilm and paper for preservation purposes.

Each of these options has benefits and drawbacks that should be evaluated carefully before an agency commits its resources. When selecting a document management solution for

an organisation a records manager must be sure to find one that will be able to offer the organisation exactly the solution it needs.

4 Cost benefit analysis and managing the life cycle of records

The life cycle theory, which has been described by Järvenpää (2004) as a framework for describing a system in constant change, is well understood in the field of records management despite the criticism that has been levelled against it (Akussah 1996; An 2001; Bilotto & Guercio 2003; Chachage & Ngulube 2006; Harris 2000; Kennedy & Schauder 1999; Kenosi 1999; Mnjama 1996, 2005; Ngulube & Tafor 2006; Penn, Pennix & Coulson 1994; Robek, Brown & Stephens 1995; Saffady 2003; Ricks, Swafford & Gow 1992; Shepherd & Yeo 2003; Upward 2005). Change is portrayed as the evolution that these systems experience throughout the stages of their life cycle (Frey, Christensen & DiSantis 2007). Each stage comprises a specific set of processes that the system undergoes during its evolution. Even though the life cycle theory has its origin in biology it has spread to less organic sectors such as the managerial field, software industry and records management. In the records management context, the life cycle looks at the production/creation, distribution, use and disposal of records. In these four life cycle stages, the records require different document management strategies. The determining factor in the choice of the each document management strategy is highly influenced by costs, the needs of the users and the longevity of the information contained in records. Of course, the overarching consideration should be improved records management and making records management processes more efficient and cost effective.

Records management is suffering from dwindling resources, high inflation and the need to obtain value for money. Allocation for funds for the records management function has been traditionally low, but the situation is becoming worse. It has become essential to show the benefits of records management in saving costs and helping the organisation to operate effectively. Optimising the trade – off between various document management strategies may assist records managers to select the best solution that may reduce information management costs. However, it seems the tendency among many records managers to base their adoption of a documents management solution on the basis of the initial cost. Basing acquisition on the initial purchase cost is prevalent in many departments across organisations (Woodward 1997). It is essential to anticipate the source and magnitude of lifetime costs through life cycle costing so that the right long – term choices can be made. Among others, the objectives of life costing are to enable investment options to be more effectively evaluated and to facilitate choice between competing alternatives (Woodward 1997).

There is need to identify and quantify all the significant costs in the management of business records throughout its life cycle. The life cycle cost of a record is the sum of all funds expended in managing the record from its creation thorough to its use and maintenance, and to its disposal. The documents management strategies offer a framework that can be used to adopt an optimum way of saving costs. The costing procedure involves grouping all the costs involved in managing the record in a certain medium and identifying potential trade – offs with various formats. The cost can be divided into four categories: creation, distribution and usage; storage and maintenance; retention and disposition. One of ways of coming up with a cost structure is the utilisation of the cost benefit analysis framework.

Cost benefit analysis (CBA) or benefit cost analysis (BCA) is a comprehensive analytical technique used to estimate and compare the costs and benefits of a chosen solution to a problem (King & Schrems 1978). The value of a course of action is added up minus the costs

associated with it. While costs may be either once – off or on-going benefits are usually received overtime. Typically, performance, time and costs are fundamental to CBA. However, there is no universally agreed cost - estimating method (Wübbenhorst 1986). Kaufman (1970) speculates that the procedure of establishing costs and benefits of particular course of action may involve some of the following:

- establish the utilisation factors (for instance, how is the format going to be exploited);
- identify all costs elements (for instance operating personnel salaries, overhead costs, land, buildings, fees, furniture, labour, materials, fuel power, and equipment);
- determine the critical costs parameters (energy use rate, for example);
- calculate costs at current prices (purchase/acquisition, installation, training and maintenance costs);
- escalate current costs at assumed inflation rates; and
- sum – up all costs.

CBA may help records managers to assess the economic efficiency of document management approaches. Through cost benefit analysis, it is possible to demonstrate convincingly that the financial benefits will far outweigh the costs. A document management strategy would be attractive if the benefits it would produce exceed the costs, that is, a positive financial return on investment. However, it should be borne in mind that not everything can be reduced to numbers. Even though benefit and costs are expressed in monetary terms the language that the people who control budgets understand, records managers should be aware of the uses and limitations of the costs benefit tools for assessing document management strategies. There are a lot of intangible benefits associated with each approach. The costs and benefits are hard to identify and quantify in a records management situation. Intangible factors are ever present. According to Smith (2007) intangible benefits include ease of filing, access to information, ability to respond quickly, better quality of work and improved staff morale.

There are many questions to be considered when choosing the appropriate document storage technology. Questions influencing the decision include:

- What does the policy or legislation governing records management say?
- What is the records management budget?
- What is the cost of implementing the solution?
- Is staff available to implement the records management solution?
- What is the volume of records?
- What is the classification of records?
- Where will be the records stored?
- Where will people need to go to access the records?
- How can records be available to the people that need them?
- How long should the records be retained?
- Is the format admissible in evidence or other legal proceedings?
- How can the records be preserved into the future?

The cost of the document management approach may not be the ultimate decisive factor in making one's choice, but costs are an essential element for the implementation of any solution that is selected. In that regard, Table 1 provides a rough indication of the cost of using paper –based records solutions as compared to microfilm.

Table 1: Paper versus microfilm

Hard-copy costs (Contents of 4 - drawer filing cabinet with 10 400 pages of records)	Office	Microfilm system costs	
Floor space	R13 800.00	Document preparation	R750.00
Storage equipment (Amortized) and supplies	R400.00	Supplies (film @ 8 cents/page if outsourced), microfilm cabinet	R1 932.00
Labour (Maintenance/retrieval)	\$7 000.00	Labour	R3 750.00
Total annual cost	\$21 200.00		R6 432.00

Source: (Oregon State Archives 1994; The Curators of the University of Missouri 2009; Canepi 2003). Costs were converted to Rands (South African currency) using an exchange rate of R10.00 to US\$1.00.

Based on Zettek (2005), the electronic system for 10 users is estimated to initially cost R34 972.00. The costs include hardware such as computers, servers and network equipment, records database conversion/normalisation, actual application and configuration work that need to be done by the vendor, training and annual maintenance costs pegged at 20% of the cost of installing the system. In the long run, the decrease in costs offsets the investment to install the system, as well as costs to operate such a system during the first year. Scholars have noted that the cost benefits of system implementation can be achieved well within eighteen months of adopting an electronic records solution (Zettek 2005).

In fact the implementation of electronic technologies improves efficiency, even after on-going maintenance costs are factored in. Comparatively speaking, it is clear from the above discussion that the cost of implementing a paper – based solution to records management problems is very high and the benefits are low. Microfilm costs are also low while benefits are high. An organisation must decide whether to do it by itself or outsource the work if microfilm is chosen a records management solution. Organisations should plan to film their records every five to ten years in order to keep the costs to the minimum and assure preservation (Sumners 2007).

The cost and benefits of electronic solutions are high. Using electronic formats save costs the form of staff reallocation, space, time taken to retrieve and distribute records and elimination of duplicate records in the system. Storing the records contribute a substantial part of the true costs of operating record offices. A panoramic view of the costs and benefits of the three document management strategies is given in Table 2. The rough estimates given in Table 1 collaborates the fact that the cost of managing paper – based systems is relatively high. Any decision to select a document management format should be based on assessing cost as posited by Kaufman (1970) as discussed in the preceding paragraphs. Cost benefit analysis will also be important as it will assist to estimate and compare the costs and benefits of a chosen strategy throughout its life cycle.

Table 2: Cost benefit matrix for document management strategies at each stage in the life cycle of a record

Format	Stage	Action	Cost	Benefit
Paper	Creation	Timely availability of information, cost of paper, files to handle paper records, office space, equipment (filing cabinets, shelves)	High	Low
	Distribution and use	Can be very costly if a large number of people must access the records at the same time. Can cause delays in decision making and customer service. Photocopying records for wider distribution can be cumbersome and expensive	High	Low
	Storage and maintenance	A lot of space and office equipment is required	High	Low
	Archiving	Preservation standards know, but appraisal of the records in the system should be hallmark of operations so that only valuable are preserved. Not drastically affected by changes in technology	Low	High
Microfilm	Creation	Timely availability of records to multiple users, but the cost of microfilming may be high so an organisation must decide whether to do it by itself or outsource the work depending on its capacity. Only two per cent of the space required to store equivalent documents in paper format	High	High
	Distribution and use	Duplication and distribution cheaper than the paper equivalent, automated or manually indexed microfilmed records can be quickly and accurately retrieved. Provides a “human readable” disaster back – up for vital records	Low	High
	Storage and maintenance	Solves storage problems. Best solution for bulky records like payrolls which must be retained for a considerable length of with infrequent reference to them	Low	High
	Archiving	Recognised archival medium. Can remain stable for over 200 years if stored under proper conditions and is not drastically affected by changes in technology	Low	High
Electronic	Creation	Timely availability of information at the fingertips of users. Systems can be easily integrated though the initial cost of implementation can be very high	High	High
	Distribution and use	Improves access to records considerably and allows a large number of people to simultaneously retrieve records from their work stations. Real time access and dramatically	Low	High

		reduced wait time for records		
	Storage and maintenance	Needs less space. Records not susceptible to wear and tear. Security can be in-built into the system	Low	High
	Archiving	Preservation standards still evolving. Preserving them into the future still problematic as the medium is very fragile and affected by changes in technology	High	Low

5 Conclusions and recommendations

Making significant improvement in managing records in the future will be heavily dependent on appropriately integrating technology into daily records procedures (Robek, Brown & Stephens 1995; Saffady 2003; Ricks, Swafford & Gow 1992; Zettek 2005) Technology gives the possibility of freeing up much needed space in the office that is used for records storage. Records managers will also be freed to spend time on more productive records management activities such as appraisal, retention and maintenance than menial tasks. There is need to determine the circumstances under which each document management approach would be used in a cost effective manner. Cost benefit analysis may assist in that regard if it is incorporated into records management activities. Cost benefit analysis may be a powerful tool for determining and assigning costs and benefits, identifying all alternatives and specifying the critical characteristics demanded of the system. That way trade – offs in selecting one documents management technology over the other can be determined. Finally, records managers should also keep a checklist of what information to collect and keep in order demonstrating the cost – effectiveness of any particular document management strategy. Further research is recommended to test the efficacy of the conclusions made in this article with specific reference to the records management environment in Africa.

References

- Akussah, H. 1996. Records management: an overview. *African Journal of Library, Archives and Information Science* 6(2):101-106.
- Akussah, H. 2002. Records management and preservation in government ministries and departments in Ghana. *African Journal of Library, Archives and Information Science* 12(2):155-165.
- Akotia, P. 2003. Public sector records systems in Ghana: some lessons in development management. *African Journal of Library, Archives and Information Science* 13(2):107-117.
- Alaska State Archives. 2009. Micrographics Lab.
<http://www.archives.state.ak.us/micrographics/micrographics.html> (Accessed 11 May 2009).
- ALOS Micrographic Corporation. (2009). Why electronic document management?
<http://www.alosusa.com/why-electronic-document-management> (Accessed 7 May 2009).
- Alternative Micrographics. [nd]. Microfilming.
<http://www.alternativemicrographics.net/public/microfilm.aspx> (Accessed 1 May 2009).
- An, X. 2001. A Chinese view of records continuum methodology and implications for managing electronic records. Paper presented at an international symposium on OA System and the Management of Archival Electronic Records: Theory and Practice,

-
- Hangzhou, China. <http://www.caldeson.com/RIMOS/xanuun.html> (Accessed 2 May 2009).
- ARMA International. 2009. Standards and Best Practices.
<http://www.arma.org/standards/index.cfm> (Accessed 22 May 2009).
- Association for Information and Image Management. (2008). Definition: What is ECM?
<http://www.aiim.org/> (Accessed 12 May 2009).
- Bilotto, A & Guercio, M. 2003. The management of corporate records in Italy: traditional practice and methods and digital environment. *Records Management Journal* 13(3):136–146.
- Canepi, K. 2003. Microfilm serial backfiles: are they still cost effective? *Serials Review* 29:282-286.
- Chachage, BL & Ngulube, P. 2006. Management of business records in Tanzania: an exploratory case study of selected companies. *South African Journal of Information Management* 8(3).
<http://general.rau.ac.za/infosci/raujournal/default.asp?to=peervol8nr3> (Accessed 2 May 2009).
- Chapman, S, Conway, P & Kenney, A. 1999. Digital imaging and preservation microfilm: the future of the hybrid approach for the preservation of brittle books.
<http://www.clir.org/programs/cpa> (Accessed 11 May 2009).
- Chinyemba, A & Ngulube, P. 2005. Managing records at higher education institutions: a case study of the University of KwaZulu-Natal, Pietermaritzburg Campus. *South African Journal of Information Management* 7(1).
<http://general.rau.ac.za/infosci/raujournal/default.asp?to=peervol7nr1> (Accessed 25 May 2009).
- Eastwood, T. 2006. Challenges old and new: managing Archives in our Times. *ESARBICA Journal: Journal of the Eastern and Southern Africa Regional Branch of the International Council on Archives* 25:2-15.
- Frey, FSF, Christensen, HH & DiSantis, N. 2007. *Permanence of toner of paper – based on the life cycle of documents* Rochester, NY: Printing Industry Centre at RIT.
- Griffith, JW & Keely, BJ. 1978. Techniques of life cycle costing. *Cost Engineering* (September/October):165-168.
- Gillies, A. 2009. Electronic records can be better records.
<http://www.brighthub.com/health/technology/articles/8655.aspx>. (Accessed 13 May 2009).
- Grills, CM. 1979. Uncapping handicapped persons via micrographics. *Bulletin of the American Society for Information Science* 5(4):16.
- Grigsby, M. 1985. Micrographics – evolving to meet user needs. *Office Administration and Automation*.
<http://www.faqs.org/abstracts/Computers-and-office-automation-industries/Micrographics-Evolving-to-Meet-User-Needs-Plugging-COM-into-an-Automated-System.html> (Accessed 20 May 2009).
- Harper, S. 2004. *Library and Archives Consultancy Report*. Windhoek: Namibia Library and Information Service.
- Harris, V. 2000. *Exploring archives: an introduction to archival ideas and practice in South Africa*. 2nd edition. Pretoria: NASA.
- Huth, G. 2003. Managing imaging and micrographics projects.
http://www.archives.nysed.gov/a/records/mr_pub77.pdf (Accessed 2 May 2009).

-
- Järvenpää, E. 2004. *Life cycle terminology and definitions* (Literature review at the Laboratory of Work Psychology and Leadership). Helsinki, Finland: Helsinki Institute of Technology.
- Kaufman, RJ. 1970. Life cycle costing – a decision making tool for capital equipment acquisition. *Cost and Management* (March/April):21-28.
- Kennedy, J & Schauder, C. 1999. *Records management: a guide to corporate record keeping*. 2nd ed. Melbourne: Wesley Longman.
- Kenney, AR. 2002. Digital to microfilm conversion: a demonstration project 1994-1996. Final Report to the National Endowment for the Humanities (PS-20781-94). : <http://www.library.cornell.edu/preservation/publications.html> (Accessed 15 May 2009).
- Kemoni, H, Ngulube, P & Stilwell, C. 2007. Public records and archives as tools for good governance: reflections within the recordkeeping scholarly and practitioner communities. *ESARBICA Journal: Journal of the Eastern and Southern Africa Regional Branch of the International Council on Archives* 26:3-18.
- Kenosi, L. 1999. Records management in the public service and the Botswana's National Archives and Records Service. *African Journal of Library, Archives and Information Science* 9(2):119-127.
- Kentucky Department for Libraries and Archives. 2007. Micrographics services. <http://www.kdla.ky.gov/recmanagement/micrographics.htm> (Accessed 20 May 2009).
- King, JL & Schrems, EL. 1978. Cost-benefit analysis in information systems development and operation. *ACM Computing Surveys* 10(1):19-34.
- Makhura, M & Ngoepe, M. 2006. Assessing the extent of compliance with regards to National Archives and Records Service Act and Promotion of Access to Information Act: implications of good governance and accountability. *ESARBICA Journal: Journal of the Eastern and Southern Africa Regional Branch of the International Council on Archives* 25:95-103.
- McKemmish, S, Reed, M & Piggott, M. 2005. The archives, in McKemmish, S, Piggott, M, Reed, B & Upward, F (eds). *Archives: recordkeeping in society*. Wagga Wagga: Center for Information Studies:159-195.
- Mnjama, NM. 1996. National archives and the challenges of managing the entire life cycle of records. *SA Archives Journal* 38:24-32.
- Mnjama, N. 2003. Archives and records management in Kenya: problems and prospects. *Records Management Journal* 13(2):91-101.
- Mnjama, N. 2005. Archival landscape in Eastern and Southern Africa. *Library Management* 26(8/9):457-70.
- Myburgh, S. 2005. Records management and archives: finding common ground. *The Information Management Journal* 39(2):24-29.
- Ndenje-Sichalwe, E & Ngulube, P. 2009. Records management and Access to information: key to fostering accountability, good governance and protection of human rights in Tanzania. *ESARBICA Journal: Journal of the Eastern and Southern Africa Regional Branch of the International Council on Archives* 28:3-15.
- Ngoaketsi, MJ. 2003. A review of National Archives and Records Service of South Africa's Policy on the Management of Electronic Records in Governmental Bodies: policy guidelines. Paper presented during the XVII Eastern and Southern African Regional Branch of the International Council on Archives (ESARBICA). General Conference on Society and Good Governance, Maputo, Mozambique, 22-26 July 2003.

-
- Ngoepe, M. 2004. Accountability, transparency and good governance: the National Archives and Records Service of South Africa's role in helping Government to better service delivery to the South Africans. Paper presented at the LIASA Conference 2004. www.liasa.org.za/conferences/conference2004/papers/LIASA_Conference_2004_Ngoepe.pdf (Accessed 22 May 2009).
- Ngoepe, M. 2009. Organising public records to achieve service delivery: the role of the National Archives and Records Service of South Africa's Functional Subject File Plan in Government Departments. *ESARBICA Journal: Journal of the Eastern and Southern Africa Regional Branch of the International Council on Archives* 28:41-56.
- Ngulube, P. 2002. Preservation reformatting strategies in selected Sub Saharan African archival institutions. *African Journal of Library, Archives and Information Science* 12(2): 117-132.
- Ngulube, P. 2004. Fostering accountability and justice: opportunities for records managers in changing societies. *ESARBICA Journal: Journal of the Eastern and Southern Africa Regional Branch of the International Council on Archives* 23:23-32.
- Ngulube, P & Tafor, VF. 2006. An overview of the management of public records and archives in the member countries of the East and Southern Africa Regional Branch of the International Council on Archives (ESARBICA). *Journal of the Society of Archivists* 27: 69-86.
- Oregon State Archives. 1994. *Records management manual*.
http://osulibrary.oregonstate.edu/archives/handbook/chapter2/record_9.1.html (Accessed 3 May 2009).
- Oppenheim, C & Smithson, D. 1999. What is the hybrid library?' *Journal of Information Science* 25(2):97-112.
- Penn, IA, Pennix, GB & Coulson, J. 1994. *Records management handbook*. 2nd ed. Vermont: Gower.
- Ricks, BR, Swafford, AJ & Gow, KE. 1992. *Information and image management: a record system approach*. 3rd ed. Cincinnati: South Western.
- Robek, MF, Brown, GF & Stephens, DO. 1995. *Information and records management: document-based information systems*. 4th ed. New York: McGraw-Hill.
- Saffady, W. 1996. *Electronic document imaging: a state of the art report*. Prairie Village, Kan: ARMA International.
- Saffady, W. 2000. *Micrographics: technology of 21st Century*. Prairie Village, Kan: ARMA International.
- Saffady, W. 2003. *The document life cycle: a White Paper*. Albany, NY: State University of New York at Albany, School of Information Science and Policy.
- Saffady, W. 2007. *Digital document management*. Prairie Village, Kan: ARMA International.
- Shepherd, E & Yeo, G. 2003. *Managing records: a handbook of principles and practices*. London: Facet Publishing.
- Smith, K. 2007. *Planning and implementing electronic records management: a practical guide*. London: Facet Publishing.
- Summers, B. 2007. Microfilming your church's records.
http://www.sbhla.org/art_microfilm.htm (Accessed 14 May 2009).
- The Curators of the University of Missouri. 2009. Records management microfilm.
<http://www.umsystem.edu/ums/departments/fa/management/records/microfilm/estimating.shtml> (Accessed 13 May 2009).

-
- Tough, A & Moss, M. 2003. Metadata, controlled vocabulary and directories: electronic document management and standards for records management. *Records Management Journal* 13(1):24-31.
- Tough, A & Moss, M. 2006. *Records keeping in a hybrid environment: managing the creation, use, preservation and disposal of unpublished information objects and in context*. Oxford: Chandos Publishing.
- Tsai, J & Bond, G. 2008. A comparison of electronic records to paper records in mental health centers. *International Journal for Quality in Health Care* 20(2):136–143.
- Upward, F. 2005. The records continuum, in McKemmish, S, Piggott, M, Reed, B & Upward, F (eds). *Archives: recordkeeping in society*. Wagga Wagga: Center for Information Studies:197-222.
- Utah State Archives and Records Service. 2009. Deciding to microfilm. <http://www.archives.state.ut.us/micrographics/micrographics-guide-deciding-to-microfilm.html> (Accessed 13 May 2009).
- Wamukoya, J. 2000. Records and archives as a basis for good government: implications and challenges for records managers and archivists in Africa. *Records Management Journal* 10(1):23-33.
- Wang, SJ, Blackford Middleton, B, Prosser, LA, Bardon, CG, Spurr, CD, Carchidi, PJ, Kittler, AF, Goldszer, RC, Fairchild, DG, Sussman, AJ, Kuperman, GJ & Bates, DW. 2003. A cost-benefit analysis of electronic medical records in primary care. *The American Journal of Medicine* 114: 397–403.
- Western Micrographics and Imaging Systems. 2008. Microfilm: the economical choice. <http://www.westernmicrographicsimaging.com/microfilm.html> (Accessed 3 May 2009).
- Williams, C. 2006. *Managing archives: foundations and practice*. Oxford: Chandos Publishing.
- Willis, D. 1992. *A hybrid systems approach to preservation of printed materials*. Washington, DC: Commission on Preservation & Access.
- Wisconsin Historical Society. 2009. *Wisconsin municipal records manual*. <http://www.wisconsinhistory.org/libraryarchives/locrecs/manual/ch04.pdf> (Accessed 23 May 2009).
- Wolfinger, M. 1994. Micrographics and the environment. *Microform Review* 23(3):125-129.
- Woodward, DG. 1997. Life cycle costing – theory, information acquisition and application. *International Journal of Project Management* 15(6):335-344.
- Wübbenhorst, KL. 1986. Life cycle costing for construction projects. *Long Range Planning* 19(4):87-97.
- Zetek. C. 2005. Opportunities to improve the efficiency and effectiveness of records management processes in the city of Rochester. <http://www.cgr.org> (Accessed 3 May 2009).