

# Environmental Standards to Save Documents in the Sultanate of Oman: A Comparative Study

Nahed Mohammed Salem<sup>1,2</sup>

<sup>1</sup>Department of Information Studies, Sultan Qaboos University, Sultanate of Oman

<sup>2</sup>Department of Library and Information Science, Alexandria University, Alexandria, Egypt

**Abstract:** *This paper examines the environmental standards adopted by the Sultanate of Oman in preserving documents and manuscripts, to determine the extent to which these standards coincide with international standards in the storage of documents. To fulfill this aim, the standards adopted in the storage of documents and manuscripts in Oman were monitored and compared with international standards to identify the extent to which they are compatible with each other. The aim was also to determine which standards are lacking in the storage of documents. The findings show that there is a clear absence of many of the standards particular to the storage environment, as well as many of the standards particular to the document preservation environment outside the scope of international standards.*

**Keywords:** *archival collections, indoor environmental standards, semi-active records, storage media*

## 1. Introduction

Documents contain information that is a valuable source and important reference of previous activities and works. It is, therefore, essential for institutions and the society to find a systematic way to manage documents to protect and preserve them, so that they would survive as evidence of works and activities that have been completed [1]. On the other hand, documents are a source for historical and scientific research. Indeed, hard copy documents as the basis of recorded history, and the backbone of any country's national identity. Due to their importance, they should be preserved and protected in an adequate environment. There is, thus, a set of environmental factors, such as temperatures, humidity, particles, gases and pollutants have a strong impact upon the lengthening of the life-span of these documents [2]. These need to be part of an international framework of standards that would make the environment for the preservation of these documents adequate and conducive to their survival.

Due to the extreme importance of documents, the Sultanate of Oman has dedicated much attention to its documents. Oman has worked on collecting, preserving and managing these documents in accordance with international document management systems. Thus, a number of laws were issued which state the procedures for the management and preservation of documents, as well as the facilitation of their use. Most important of these is the Law of Documents and Records, Nr. 60/2007 [3]. In the light of the Sultanate's understanding of the importance of the environment for the preservation of documents, an amendment of Law Nr. 62/2008 was issued, to indicate the necessity of establishing a suitable space for the preservation of documents and records [4]. This was followed by the issuance of the Procedures Manual of the Current and Intermediary Documents [5].

In this study, the procedures stated in the manual will be examined, in terms of the specifications for the environment of document preservation, and comparing these with the international standards. The aim is to identify how complete the environmental standards applied in Oman for the preservation of documents and records are.

## 2. Method

The study adopted a comparative approach, to compare the specifications for preservation spaces in the Procedures Manual of the Current and Intermediary Documents [5] with the recommended international standards. The study also seeks to determine whether these specifications fall within the scope of these standards, relying upon the international standards of ISO11799 [6], and the NISO standards [7].

## 3. Definitions

The Manual: refers to the Procedures Manual of the Current and Intermediary Documents.

The Authority: refers to the National Authority of Documents and Records.

## 4. Standards for the Preservation of Documents in the Sultanate of Oman

Under the Law of Documents and Records, issued by Royal Decree Nr. 60/2007, and the amendment to Law Nr. 62/2008, it is stated that it is essential to provide a place dedicated to the preservation of documents, and preparing an environment for the preservation of the documents. Such place should be constructed and equipped in accordance with the specifications adopted in the field. This study aims at identifying the standards of the building and the stores dedicated to the preservation of the documents, as shown in Appendix 8 of the Procedures Manual of the Current and Intermediary Documents [5]. These are then compared with the international specifications (ISO11799) [6] in this field.

The Procedures Manual of the Current and Intermediary Documents: The Authority of Documents and Records prepared this Manual in December 2010. The aim was to facilitate the establishment and management of documents, by determining a set of procedures and the tasks that these apply to. The work is mainly addressed to specialists at archive and documents departments and administrations, as well as to the employees who produce documents. The Manual consists of four sections: the first is an introduction to the general framework of managing documents; the second details the preparation of various tools relevant to the management of documents; while sections three and four deal with the means of managing current and intermediary documents, as well as relevant procedures. The Manual also contains 21 appendices. Appendix 8 is dedicated to the specifications of the spaces used for the preservation of intermediary documents and the positioning of shelves in the stores.

## 5. Results and Discussion

The specifications and standards of the documents building and the standards for the preservation of documents in the stores, as stated in Appendix (8) of the Manual [5] will be reviewed and compared with the international standards (ISO11799) [6].

### 5.1. Choosing the location of the building

The Manual [5] stated the specifications of the location of the building as follows: a location far from floods and torrents; a location far from pollution; a location far from fire hazards (an oil refinery, ammunition factories, etc). Upon comparison with international specifications (ISO11799) [6], the extracted information was arranged as shown in Table 1.

TABLE I: The Specifications of the Location

International standards (ISO11799)	The manual
Not exposed to landslides or floods	√
Not exposed to danger by earthquakes, tides and ebbs, or landslides	x
Not exposed to fire or explosion risks from nearby locations	√
Not be close to a place or building that may attract rodents, insects or other pests	x
Not be near factories or other sources of harmful gas, smoke or dust emissions etc.	√
Not be close to strategic sites that may be a target in case of armed conflicts.	x

The building for the preservation of documents in Oman fulfilled three of the international specifications (ISO11799), while three other specifications were not met. The fact that the item concerning earthquakes is not met, may be attributed to the fact that the Sultanate is distant from any earthquake or volcano centres. Further, the items concerning strategic sites and rodents were not met, despite that fact that these two standards are of great importance in achieving the safety and security of documents. However, the standards of Oman stated the necessity to be distant from polluted areas in general, and this is significant, since NISO standards [7] asserted the importance of the building being far from any damages resulting from waters, fires or gases emitted by factories, etc.

## 5.2. Documents buildings

The Manual [5] states that the building should consist of stores to preserve documents and work offices. The standards for the establishment of the stores as follows: the storage space for the preservation of the documents should occupy two thirds or more of the total space of the building; the columns and ceilings of the stores should be built reinforced concrete; the floors should bear a weight of 1200 Kg/m<sup>2</sup> if the shelves are fixed, and a weight of 2400 Kg/m<sup>2</sup> if the shelves are mobile; the distance between the ceilings and the floors should be averagely three meters to allow the passage of air through all parts and between the shelves.

Hansen [8] maintained the importance of monitoring the quality of ventilation in the stores to ensure the survival of the documents. The windows should be small, and not exceed in total a tenth of the area of the wall in which they occur. The international specifications (ISO11799) indicated that it is preferable for storage areas to be windowless, a fact confirmed in the NISO standards [7]. If there are windows, however, they should be installed in such a way as to deflect direct daylight. The Manual also pointed out some of the measures to be taken to reduce the impact of sunlight, such as the presence of external corridors outside the stores, the function of which is to reduce the reflection of sunlight on the building. There should also be cement or tile shades above the windows, and the stores should be highly isolated from external climatic elements. This is in agreement with the specifications (ISO11799), which state that the design of the stores should create a stable and careful internal environment, that will ensure the highest possible isolation of the stores from external weather conditions.

## 5.3. Temperature and humidity

International specifications (ISO11799) stated the temperatures and humidity ranges allowed for paper and non-paper documents. When compared with the standards specified in the Manual, a great lack of standards can be observed, as shown in Table 2.

TABLE II: The temperatures and Humidity in the International Standards (ISO11799) and the Procedures Manual of the Current and Intermediary Documents (2010) in Oman

Type of materials	ISO 11799:2003				Procedures manual of the Current and intermediary documents (2010)	
	Temperature		Relative humidity		Temperature	Relative humidity
	Range	Tolerable daily changes within the limits	Range	Tolerable daily changes within the limits	Range	Range
Paper, optimum preservation	2-18	±1	30-45	±3	18-20	55%
Paper, staffed stack areas, items in regular use	14-18	±1	35-50	±3	18-20	55%
Parchment, leather	2-18	±1	50-60	±3	18-20	55%
Audiovisual documents and electronic documents						35%

By comparing the international specifications and what has been stated in the Manual, a great discrepancy may be observed. The maximum temperature of 18 degrees identified in the Specifications, is the minimum temperature in the Manual. This discrepancy does not mean that there is great danger affecting the preserved

materials, since the difference ranges from 2 to 4 degrees. This indicates that the standards stated in the Manual are relatively adequate for the preservation of paper documents. Actual readings of temperatures in the storing environment at the Documents Authority stores and some of the intermediary documents stores proved to be close to the permissible range. However, measurements of other stores were found to be quite different from the permissible ranges [9]. This may be attributed to the lack of air conditioning systems in these stores, which would aid in reducing temperatures. It is, therefore, essential to revise the temperature standards so that these would fall within adequate ranges. Inadequate temperatures cause chemical and physical effects that may lead to bookworms and the spread of insects hazardous for these documents [10].

Upon comparing the humidity ranges, we find great differences that reach up to 10 degrees. Actual measurements of humidity in the intermediary documents stores have shown a great rise in humidity readings which go beyond all standards, reaching 63.42% [9]. This poses great danger for the documents, since high humidity ranges cause the swelling of paper and vellum, which may stick together, leaking ink from one surface to the other, and allowing the growth of mildew at levels above 60% [11].

As for audio-visual materials, the Manual included only one standard, namely 35% of humidity for all audio-visual materials, thus neglecting temperatures. International specifications, on the other hand, stated a number of different standards for temperatures and humidity, suitable for each type of audio-visual media, such as films, micro-films, photographs, etc. Neglecting temperature and humidity standards in the Manual poses a great threat to audio-visual documents, and it is therefore essential for the Authority to provide a suitable preservation environment to ensure their longer survival.

#### 5.4. Maximum limit tolerance for air pollutants

The International specifications identified the maximum limits and percentages for air pollutants, dust and various gases. However, upon examining the Manual, it was found that these are not mentioned (Table 3).

TABLE III: Maximum Limits for Air Pollution

Type of pollutants	ISO 11799:2003		Procedures Manual of the Current and Intermediary Documents (2010)
	Maximum limits tolerance		
	volume fraction × 109	µg/m <sup>3</sup>	
Sulfur dioxide (SO <sub>2</sub> )	5-10	-	-
Nitrogen oxides (NO <sub>x</sub> )	5-10	-	-
Ozone (O <sub>3</sub> )	5-10	-	-
Acetic acid (CH <sub>3</sub> COOH)	< 4	-	-
Formaldehyde (HCHO)	< 4	-	-
Dust particles, including mould spores	-	50	-

The International Specifications ISO 11799 identified the following types of pollutants: CO<sub>2</sub>, NO, and O<sub>3</sub> at a level of 5 to 10. Though NISO [7] agree with this range, the Manual did not mention any standards concerning pollution. There are no devices in the stores to measure the rate of pollution by these. Similarly, the International Specification (ISO 11799) stated that the percentage of acidic acid and formaldehyde should be less than 4 percent of the total volume. However, no readings of this acid are taken at the Documents Authority stores and the intermediary archives, nor are readings of dust particles and germs taken. There is no control whatsoever of air pollution. This makes the air at the documents preservation stores is not compatible with the preservation specifications identified in the International Specifications. It is, therefore, essential to provide the devices needed for air-pollution measurements, aiming at ensuring an environment free of air pollutants. Dust particles of various sizes are a great source of concern for documents, since dust is a nutritious environment for insects and fungi as it creates a microenvironment on the surface of documents. Thus, it prevents the flow of air, which in turn increases the paper's absorbency of humidity, and may lead to the spread of the plague [12]. A study by Salem et al. [13] has shown that most environmental factors that are measured in the intermediary stores of the Ministry of Manpower, the Ministry of Municipality and the Ministry of Water Resources, did not fall within the values stated in different international standards. The quality of air in these stores was poor and not suitable for the protection and preservation of documents.

## 6. Conclusion

The current study aimed at comparing the standards stated in the Procedures Manual of the Current and Intermediary Documents in Oman for the establishment of buildings and stores to preserve documents, with the standardized specifications of ISO 11799 and the NISO standards. The findings of the study showed some agreement in the specifications relevant to the location of the buildings and its construction with the international standards. However, the standards of temperatures and humidity as stated in the Manual do not fall within the values determined in international standards. There is also a total absence of any standards concerning permissible air pollution levels in the stores. Hence, it is essential to take preventive measures that will help protect the documents from damage and destruction. It is also essential to review that standards stated in the Manual, to amend and complete missing standards relevant to the quality standards of the air in the stores.

## 7. References

- [1] ISO 15489: 1, "Information and Documentation: Records Management. Part 1. General," Switzerland, 2001.
- [2] J. Karbowska-Berent, R. L.Górny, A. B. Strzelczyk, A. Wlazło, "Airborne and dust borne microorganisms in selected Polish libraries and archives," *Building and Environment*, vol. 46, pp. 1872-1879, 2011.  
<http://dx.doi.org/10.1016/j.buildenv.2011.03.007>
- [3] Royal Decree No. (60/ 2007) "The Records and Archives Law," Official Gazette, No.843, 2007.
- [4] Royal Decree No. (62/ 2008) "The Records and Archives Law," Official Gazette, No. 862, 2008.
- [5] National Records and Archive Authority (Oman), "Manual of Management Procedure of Current and semi-active records," Muscat, 2010.
- [6] ISO 11799, "Information and documentation- archive and library materials," Switzerland, 2003.
- [7] William K. WILSON, "Environmental guidelines for the storage of paper records: a technical report," sponsored by the National Information Standards Organization, Bethesda, Maryland, USA: NISO Press, 1995.
- [8] M. T. Hansen, N. Nohria, T. Tierney, "What's your strategy for managing knowledge?" *Harvard Business Review*, pp. 106-116, March-April 1999.
- [9] N. Salem, S. Abdul-Wahab, "Indoor air quality of the storage of semi-active records in Oman," in Proc. The 3<sup>rd</sup> Technical Conf. on Hydraulic Engineering (CHE2014), 2014, pp. 155-158.
- [10] J. Henderson, "The preservation advisory center: Environment" The British Library Design Office, 2010.
- [11] E. Menart, G. De Bruin, M. Strlič, "Dose-response functions for historic paper," *Polymer Degradation and Stability*, vol. 96, pp. 2029-2039, 2011.  
<http://dx.doi.org/10.1016/j.polymdegradstab.2011.09.002>
- [12] S. Borrego, I. Perdomo, "Aerobiological investigations inside repositories of the National Archive of the Republic of Cuba," *Aerobiologia*, vol. 28, pp. 303-316, 2012.  
<http://dx.doi.org/10.1007/s10453-011-9235-x>
- [13] N. Salem, S. A. Abdul-Wahab, A. Sappurd, "Environmental assessment in manuscripts library and storages of semi-active record at Sultanate of Oman," *International Journal of Knowledge Management*, vol. 9, pp. 65-81, July-September 2013.  
<http://dx.doi.org/10.4018/ijkm.2013070105>