The Reality of Using Cloud Computing in Information and Record Management in Oman

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Abstract

The aim of this study is to explore the main applications of cloud computing in records management and to understand the views of records managers on the use of these applications in Omani institutions. It aims to identify the benefits, potential challenges, and the proposed solutions associated with the implementation of cloud computing in records management. The study used the descriptive analytical approach and conducted surveys to collect data on the use of cloud computing applications to manage, store, and access records in Omani institutions. The study included the views of 105 records managers from 32 Omani institutions, including ministries, universities, and authorities. In addition, a focus group was formed consisting of 9 participants from various records departments in various Omani institutions, such as the Ministry of Justice and Legal Affairs, the Ministry of Finance, the Oman Oil Development Company, the Ministry of Higher Education, Research and Innovation, and others. The study found that the majority of records managers prefer that organizations provide cloud computing services themselves. The cloud applications most used among participants were email services, Microsoft Office, Google Apps, and Dropbox. The main record-related activities included exchanging records with other organizations, storing and archiving records, sharing files within departments, and email management. Records managers emphasized the need for training programs to enhance their skills in electronic archiving, cloud computing, and modern record management techniques. The study recommends raising awareness among relevant stakeholders, including records management professionals and organizational leaders, about cloud-based record management systems and their potential to improve efficiency. Additionally, it suggests aligning cloud solutions with Omani regulations concerning data protection and record retention. The study also recommends providing financial and technical support to records departments in institutions for the implementation of best practices in cloud-based record management systems, as these systems rely on information and communication technologies.

Keywords: *Cloud computing, Records management, Omani institutions, National Records and Archives Authority.*

Introduction

Cloud computing is defined as allowing users to access a network and make appropriate use of a shared set of computing resources (servers, storage, applications, and services) (NIST 2011). The cloud consists of the interconnection and sharing of technology resources located within an entity or organization, in on-premises, off-premises or hybrid structures, with access governed by Internet protocols and standards (CGI, 2017). Cloud computing uses many existing technologies, including high-speed internet, clustering, client-server computing, and large geographically dispersed data centers. Cloud computing is simply providing these services as a single package. Many business records, such as training manuals, HR guidelines, checklists, and tender papers, are created and managed daily by organizations. The more these records are created and relied upon to perform business, the greater the need for record management practices, including a cloud record management system. Moreover, cloud computing requires appropriate IT infrastructure, enabling organizations to manage, store and retrieve vast amounts of records and data quickly, flexibly, affordably and with high quality (Saxena and Al Tamimi, 2017).

There are four service models for adopting cloud computing: infrastructure as a service, software as a service, platforms as a service, and data as a service. Infrastructure as a service (IaaS) refers to infrastructure on demand, a combination of hosting and supplying essential devices and services that the supplier provides to the user to operate the cloud. The user controls the deployed operating, storage, and application systems rather than the cloud's infrastructure (CGI, 2017). Nevertheless, Software-as-a-Service (SaaS) refers to software applications remotely owned or operated by the provider and can be accessed by the client, typically via the internet. Examples of SaaS e-mail applications include the record to the Web (CGI, 2017). The user has no control over basic infrastructure or applications. Platforms as a Service (PaaS) aims to

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enable users to deploy their applications to the cloud using cloud service provider resources. The user does not manage or control infrastructure but maintains control over the published material such as Facebook and Sharepoint (CGI, 2017). Furthermore, Data-as-a-Service (DaaS) signifies that the user can obtain data on demand anytime by relying on cloud computing, which delivers the data to the requested sources (Zayki, 2012). Therefore, depending on the user's requirements, cloud computing can be divided into private, public, hybrid, and community cloud. Private Cloud is constructed internally to meet business requirements; servers are located on the organization's premises and can be accessed via a secure, closed network managed by the Systems or Information Technology Center (Noumsi, 2012). Public Cloud is created by a company that provides its technological infrastructure and resources to diverse businesses that must pay for the required services on demand. However, in a hybrid cloud, the public and private cloud are combined; applications can be migrated to a public cloud utilizing existing data stored in a private cloud, or the existing and hosted services can be consumed in another public cloud (Mirenayat, 2017). A hybrid cloud can help businesses control sensitive applications and data, whereas the Community Cloud is only available to select organizations with similar interests.

Research Problem

Records management in the cloud plays an important role in making managing records easier, faster, and more efficient. However, this trend raises important issues, such as trust in using third-party cloud service providers to store records and collections of digital archives and the implications for records and archives management professionals to understand and evaluate it (McLeod & Gormly, 2017).

With the technical development represented by the emergence of cloud computing, records manager has a great challenge in how to benefit from the advantages offered by cloud computing in solving the problems of storing, making available, and trading records and privacy issues, and the possibility of losing paper records, or misplacing them when they are returned, in addition to other costs of file's reservation and maintenance. On the other hand, cloud computing in records management requires high technical skills for specialists and their knowledge of computing services to benefit from them. Therefore, this study aims to identify cloud computing applications in records management and its benefits and challenges for records departments in Omani institutions. It is hoped that the study will be of benefit to records management in Omani institutions by increasing awareness and training managers on cloud computing applications.

Study Methodology

The study used the descriptive analytical approach and survey as a tool to collect data related to the use of cloud computing applications in managing, preserving, and providing access to records in Omani institutions and to identify the views of records managers about the benefits and challenges of application in their institutions in achieving availability and sharing records. The study also used one of the qualitative research methods, which is the focus group tool, so that it is possible to focus on all members of the study sample without focusing on a specific individual, asking questions in an interactive session and recording notes or the most important information obtained from the group. The data for this study was collected during July and August 2023. A survey was distributed to the records managers working in the records departments of various institutions in Oman. The next Tables (1, 2, 3) present data on the survey respondents within the records departments included in the study. The tables provide information on the respondents' demographics, including gender, academic qualifications, the academic institution from which they obtained their qualifications, and their experience in records management.

Table 1 The Institutions and Workplace of Records Managers Who Participated in The Survey

N.		Entity		Participants	.1
1	.4	Petroleum Development Oman	.3	7	.2
2	.7	Public Corporation for Industrial Estates (Madayn)	.6	6	.5
3	.10	Ministry of Education	.9	6	.8
4	.13	Oman Medical Specialty Board	.12	5	.11

N.		Entity	Participants	.1
5	.15	Asyad Group	5	.14
6	.18	Ministry of Agriculture, Fisheries and Water Resources .17	5	.16
7	.21	Ministry of Higher Education, Research and Innovation .20	5	.19
8	.24	Sultan Qaboos University .23	4	.22
9	.27	Ministry of Labor .26	4	.25
10	.30	Ministry of Health .29	4	.28
11	.33	National Records and Archives Authority .32	4	.31
12	.35	Ministry of Heritage and Tourism	4	.34
13	.38	Ministry of Justice and Legal Affairs .37	3	.36
14	.41	Ministry of Endowments and Religious Affairs .40	3	.39
15	.44	Environment Authority .43	3	.42
16	.47	Public Authority for Special Economic Zones and Free .46 Zones	3	.45
17	.50	Higher Judicial Institute .49	3	.48
18	.53	Ministry of Social Development .52	4	.51
19	.56	Ministry of Transport and Communications .55	4	.54
20	.59	Oman Air .58	2	.57
21	.62	State Council of Oman .61	3	.60
22	.65	Ministry of Defence .64	2	.63
23	.68	Royal Oman Police .67	2	.66
24	.71	Oman Airports .70	2	.69
25	.74	General Secretariat of the Tender Board .73	2	.72
26	.77	Foreign Ministry .76	2	.75
27	.80	The University of Technology and Applied Sciences .79	2	.78
28	.83	Ministry of Energy and Minerals .82	2	.81
29	.86	Salalah Free Zone .85	1	.84
30	.89	Public Authority for Stores and Food Reserve .88	1	.87
31	.92	Muscat Electricity Distribution Company .91	1	.90
32	.95	Royal Court Affairs .94	1	.93
	.98	**Total** .97	105	.96

The above Table (Table 1) indicates that the study involved records managers from 32 Omani institutions, including Ministries, Authorities, and Companies, and 105 records managers and technicians from 32 departments. In addition to the National Records and Archives Authority, 105 records managers from the records departments of Omani institutions responded to the survey. This number can be considered a representative sample of records departments in Omani institutions, as they belong to various entities subject to the application of the records and archives law (60/2007). The National Records and Archives Authority has approved their record system, and their activities are diverse (ministries, universities, bodies, etc.).

Table 2: Characteristics of Participants in the Study Survey

Characteristic		No.	%
Gender	Male	57/105	54.3
	Female	48/105	45.7
Years of Work	1-10 years	48/105	45.7
	11 - 20 years	40/105	38.1
	More than 20 years	17/105	16.2

place of work (Entity Type)	Government	75/105	71.4
	Private	30/105	28.6
Qualification	Master	15/105	14.3
	Bachelor	63/105	60
	Higher Diploma	14/105	13.3
	General Diploma	13/105	12.4

It is clear from the above table that more than two-thirds of the sample members who responded to the survey (75) were male (71.4%), while (30) of them were female records managers (28.6%). Out of the total respondents, which included 57 specialists and record technicians, (54.3%) had more than ten years of experience. On the other hand, 46.7% of the respondents had 1-10 years of experience. This indicates that the study sample had many individuals with job experience. Among the respondents, 63 employees (60%) possess a bachelor's degree, while 15 employees of the sample (16%) hold a master's degree. On the other hand, a notable proportion of the workforce, specifically 27 individuals (25.7%) of the total, possess higher and general diplomas.

Table 3: Distribution Of Participants According to Their Job Title

Job Title	No.	%
Records and Archives Specialist	28	**26.6**
Records Technician	17	**16.3**
Head of the correspondence and Records Department	14	**13.4**
Records Department Manager	10	**9.5**
Administrative clerk	7	**6.6**
Records management officer	6	**5.7**
Office Manager	6	**5.7**
Assistant Director of Records Department	5	**4.8**
Data entry	4	**3.8**
Supervisor	4	**3.8**
Information and data specialist	4	**3.8**
Total	105	**100**

Regarding the job titles of the study sample, the most prevalent job title observed was "Records and Archives Specialists," (26.6%) of the sample. Following this, the title of "Record Technician" constituted (16.3%) of the sample, while the position of "Head of the Correspondence and Records Department" represented (13.4%) of the sample. Lastly, the job title "Director of the Records Department" constituted (9.5%).

The focus group consisted of (9) members, as shown in table (7). The study sample was coded to protect the data's confidentiality and allow the study sample to freely express their perceptions and opinions.

Table 2 Distribution of The Study Sample According to The Job Title.

The Entity	No.	Code
Ministry of Justice and Legal Affairs	1	**m1**
Ministry of Finance	1	**m2**
Petroleum Development Oman	1	**m3**
Ministry of Higher Education, Research and Innovation	1	**m4**
Asyad Group	1	**m5**

Nama Group	1	**m6**
Oman Airports	1	**m7**
Oman Airports	1	**m8**
Environment Authority	1	**m9**
Total		**9**

Literature Review

The intellectual production on cloud computing in information organizations is diverse, covering cloud computing, its types, benefits, and potential drawbacks. At the level of records managers' awareness of cloud computing, Richards' study (2018) on records management in the cloud suggests that records management professionals need training so they can more effectively participate in the technologically changing environments and potential risks that cloud computing presents to maintain and secure ownership of records and data. In France, most companies believe that using the cloud in any form (internal or external) leads to necessary shifts for the company in its approach to digital transformation, which means the need for appropriate governance that can adapt to manage the constant functional and technical developments in the cloud. Therefore, training and awareness should be observed among records managers and relevant people to follow the technological development of the cloud (CIGREF, 2015).

Regarding cloud computing applications in records management, the study of Shibambu and Marutha (2022) reveals the important role played by cloud computing applications in bringing about radical changes in the mechanism of records management and disposal.

In the same context, the study of Bellin and Eckard (2022) indicated that the University of Michigan (UM) uses cloud computing applications to enhance its services. They assert that cloud computing applications that are of great importance in business and organizational landscape include Google G Suite, Microsoft 365, Box, Dropbox, and Canvas. These applications are preferred as solutions designed to meet the requirements of the business environment. Ali and Miraz's study (2013) revealed that the most prominent providers of cloud services for organizations and individuals are Apple with its iCloud service, and Google with its email service. Likewise, Raddad's study (2021) confirmed that Google's cloud computing applications are the most widely used by individuals and institutions. Google Drive came at the forefront of these applications with a usage rate of 88.6%. Durante's study (2015) indicated that more than half of employees use Dropbox and Google Docs applications to store their work and protect it from damage or loss. Furthermore, the study of Elsawy and Salem (2021) confirmed that the most popular services provided by records managers in the Sultanate of Oman are: email, Google Drive, Google Doc, and YouTube, respectively.

At the level of <u>advantages of applying cloud computing in the context of records management</u>, the CGI study (2017) indicates that record management applications in the cloud provide unique features such as the ability of multiple users to access the same record from any location worldwide, the implementation of user permission-based checks on records and restrictions, the elimination of record clutter, the capability to upload and access electronic records, and the provision of up-to-date backups for enterprise data and records. For records managers and archivists, using cloud services to store records is of particular importance; since more data and information are created and stored in the cloud, and the ability of cloud service providers to store their organization's records can be trusted (McLeod & Gormly, 2017). Record management systems in the cloud are important for increasing the enterprise's productivity, as 77% of business owners want to access files remotely (BIT.AI, 2020). The Newa Study (2017) shows that cloud computing allows employees to access their files and data regardless of location and time, and this feature is one of the most important features of cloud computing applications. The study conducted by Al-Mutairi (2018) further highlights the benefits of cloud computing, particularly in terms of cost savings. This is achieved through reduced software expenses and eliminating the need to provide all software packages for every device within the organization. Instead, specialized employees are equipped with the necessary applications on their own devices. According to Azam's study (2019), utilizing cloud storage services has effectively decreased maintenance costs associated with hardware and software.

Despite the benefits offered by cloud computing, its implementation in record management and information systems presents some challenges. Regarding the availability of the necessary infrastructure for information and communication technologies, Raddad's study (2021) concludes that internet speed and inadequate infrastructure are the greatest obstacles to cloud computing. Al-Zuhri (2018) emphasizes the significance of a technological infrastructure that facilitates the application of electronic services, such as cloud storage, as demonstrated by the availability of devices and the internet. At the level of required cost, cloud storage technology makes a significant contribution to reducing the value of the financial cost of the traditional methods used for the storage process, and this requires organizations to understand and determine the total cost of operations and fees that may be charged before signing a contract with a cloud storage service provider (North Carolina State University). Therefore, it requires cost modeling, active monitoring, and the estimation of the long-term economic effects of cloud storage (McLeod & Gormley, 2017).

In terms of record security and the extent of trust in digital records, Duranti (2012) discussed the impact of cloud computing on the extent of trust in digital records, clarifying the concept of trust in records and data, the importance of respecting the common legal framework around which trust issues revolve, and the challenges posed by cloud computing. The records management in the cloud standard emphasizes the importance of good planning the implementation of record management in the cloud (SO/TR 22428-1:2020) and considering important points such as safety of digital records, regulatory, legal, and normative requirements, risk assessment in any record cloud-based context, data backups and save failures should be taken into account. Bassett (2015) added that unauthorized access to records by third parties, such as hackers, and their ability to modify or delete them poses a great risk to the organization and its workflow, which may cause damage to the value of records.

On the other hand, safety concerns related to hacking and cyber-attacks on stored data are among the challenges facing the application of a cloud storage service that may cause damage to customer data, whether through manipulation or violation and theft (Azam, 2019). However, Chilamkurti et al. (2018) see that cloud storage systems possess great protection power that helps to save data from damage or violations.

Mohammed's Study (2017), which aimed to identify the benefits and challenges of cloud computing in meeting the new technical and social requirements of the knowledge society, added that the loss of data privacy may occur if the system fails, and its backups are not placed continuously. That is why the United States National Archives points out several considerations that federal agencies should think about before adopting records-to-cloud services; of which cloud vendors need to be able to demonstrate the security and privacy of data, ensure round-the-clock, seven-day access to data and services, cloud software should be able to transfer archival records to United States National Archives or delete records according to United States National Archives data retention schedules, and data reliability and long-term sustainability should be carefully considered (Weisinger, 2010).

Study Results and Discussion

Based on the study questions, the results of the study will be presented and discussed around four basic topics:

Records Managers' Awareness of Cloud Computing

The first question of the study aimed to determine the level of cloud computing awareness among records managers and the role of Omani institutions in supporting their technical knowledge. The tables (8, 9, 10, 11) display the level of technical knowledge of a sample of specialists and technicians (specialization, the academic institution from which they graduated, type of technical qualification received, level of technical knowledge in using computers and the internet, technical training programs received or assigned by their institutions). The data presented in tables (8, 9, 10, 11, 12, and 13) along with the insights gathered from the focus group, provide valuable insights at the level of awareness and knowledge of records managers about cloud computing.

Table 3: The Academic Qualifications of Records Managers Participating in The Study

Specialization	No.	%
Records and Archives	58	**55.2**
Information studies	14	**13.3**
Information Technology	13	**12.4**
Other majors	20	**19.1**
Total	105	**100**

Regarding the specialization of the study sample, it is clear from the table above (3) that most of the participants (55.2%) specialized in Records and Archives. It was followed by information studies with 13.3% of the sample, then information technology with 12.4%. However, a notable number of individuals, specifically 19.1% of the sample, comes from diverse academic backgrounds such as management and sociology.

Table 3 : The Educational Institution from Which the Records Specialists Obtained Their Bachelor's Degree or Higher Diploma.

Academic Institution	.3	No.	.2	%	.1
Sultan Qaboos University	.6	32	.5	30.5	.4
Middle East College	.9	43	.8	40.9	.7
A'sharqiyah University	.12	0	.11	0	.10
Higher Institute of Documentation, Tunisia		8	.14	7.6	.13
Other Academic Institution	.17	22	.16	21	.15
Total	.20	105	.19	100	.18

It is clear from the previous table (4) that most of the study sample members (78%) obtained qualifications from academic institutions that offer academic programs to train records specialists. These institutions include the Middle East College (40.9%), Sultan Qaboos University (30.5%), and the Higher Institute of Documentation in Tunisia (7.6%). However, 21% of the participants in this study were graduates of academic institutions other than those specializing in records, information studies, or information technology. This result indicates that 19.1% of participants (table 3) do not have a background in these fields

Table 4: The Academic Qualification Obtained by Record Specialists Within the Field of Computer and Internet

Type of Technical Qualification	No.	%
Academic Qualification	39	**37.1**
Training	41	**39.1**
Personal knowledge	25	**23.8**
Total	105	**100**

Regarding the technical qualifications obtained by the study sample (Table 10), it was found that 39% of records managers received formal training in computer use and internet skills. Additionally, 37.2%

possessed a scientific qualification facilitating their computer and internet proficiency. Furthermore, 25% of the sample relied on their self-developed skills to acquire knowledge of computer and internet usage. One-third of the participants in the study (33.3%) perceive their technical proficiency in utilizing computers, applications, and internet as "excellent." Meanwhile, two-thirds of the participants perceive their technical knowledge as either average (22%) or above average (44%). Therefore, record specialists received training programs, with computer skills at 83.3% and electronic record management and archiving systems at 65.7%. However, 14.3% received training programs related to cloud computing and modern technologies. The focus group respondents agreed that records managers need training programs, but they noted a significant weakness in training programs in record management and cloud computing. They also suggested the employees' need to acquire skills related to change, problem-solving, computers, and information technology. The participants recommended linking record science with information technology in universities and colleges to keep up with the field's changes.

According to the study, over two-thirds of record specialists needed specialized training in information technologies related to record management, electronic archiving, cloud computing, and record and data management technologies. This aligns with the findings of Richards' study (2018) highlighting the importance of training record management professionals in cloud-based record management and modern technologies. This training enables them to effectively navigate evolving technological landscapes and address the potential risks associated with cloud computing. It also helps them maintain ownership of records and data, ensure their protection, control accessing and making records available. Additionally, the study emphasizes the need for cloud computing designs to consider these concerns.

Table 5: The Level of Technical Knowledge of Records Manager in Computer Applications and Internet

Level of Technical Knowledge	.101	No.	.100	%	.99
Excellent	.104	35	.103	**33.3**	**.102**
Above average	.107	42	.106	**40**	**.105**
Average	.110	28	.109	**26.7**	**.108**
Weak	.113	0	.112	**0**	**.111**
Total	.116	105	.115	**100**	**.114**

Table 6: Training Programs Provided by The Foundation for Records Managers

Training Programs	No.	%
Computer Skills	88	**83.8**
The use of record management and electronic archiving systems.	69	**65.7**
The use of transactions or e-mail	67	**63.8**
How to search the internet and use social networks and websites.	46	**43.8**
Cloud computing and modern technologies in record and data management.	15	**14.3**

Table 6 shows that records managers described their level of technical knowledge as average, above average, or excellent. (26.7%) of them are average, (66.7%) are above average and (33.7%) are excellent. This result differs from what some studies indicated about the weakness of professional employees in computing and cloud storage services (Al-Dhaheri, 2018). Information technology departments or information systems centers in Omani institutions can assist and partner with records managers in providing training programs in choosing a records management system in the cloud, integrating the cloud service into the systems ecosystem, and other modern technical topics related to the activities of registration departments and centers in Omani institutions.

All focus group participants agreed that record specialists in Omani institutions were unaware of cloud computing services, as (M1) stated that specialists did not receive any academic education or training about cloud computing and that it remains individual efforts for each specialist based on his knowledge of modern record management technologies, while (M8) stated that cloud computing services may already be used in record management. Therefore (M 5) emphasizes the importance of updating academic plans and programs to keep up with record management changes, including cloud computing services, which academic record management research did not cover. Since the global trend is toward eliminating paper and using technology, (M5) suggested that cloud computing will be one of the pillars of record management in the future.

Table 7 The Role of Omani Institutions in Providing Technical Knowledge Records Manager.

Technical knowledge of records managers .121	Strongly Agree .120		Agree .119		Neutral .118		Disagree .117		Strongly disagree	
The institution offers adequate accessibility to various websites and social networks.	27	.126	30	.125	21	.124	17	.123	**10**	**.122**
	%25.7	.131	%28.6	.130	%20	.129	%16.2	.128	**%9.5**	**.127**
The institution offers a satisfactory level of internet access.	35	.136	38	.135	13	.134	10	.133	**9**	**.132**
	%33.3	.141	%36.2	.140	%12.4	.139	%9.5	.138	**%8.6**	**.137**
I prefer the institution provide its cloud computing services (servers, storage media, applications, and software).	43	.146	33	.145	17	.144	12	.143	**0**	**.142**
	%40.4	.151	%31.6	.150	%16.4	.149	%11.6	.148	**%0**	**.147**
It is preferable for the institution to provide cloud computing services to others.	18	.156	19	.155	35	.154	21	.153	**12**	**.152**
	%17.1	.161	%18.1	.160	%33.4	.159	%20	.158	**%11.4**	**.157**
The institution can benefit from cloud services offered by other providers, such as Google Drive and Gmail.	25	.166	39	.165	16	.164	15	.163	**10**	**.162**
	%23.8	.171	%37.1	.170	%15.2	.169	%14.3	.168	**%9.6**	**.167**

The data presented in table (8) indicates that the participants in the study had varying opinions regarding the extent to which the institution supports the technical knowledge of the records managers. These opinions ranged from neutral to strongly agreeing as follows:

About the statements "the institution provides access to all websites and social networks" and "the institution provides satisfactory use of the internet" (statements 1, 2), the approval rate of the records managers (strongly agree, agree) and their satisfaction with the availability of the internet is significantly high (69.5%) compared to their ability to access all websites and social networks in a satisfactory manner, which was only (54.3%). According to the feedback provided by focus group participants, it was observed that organizational infrastructure possesses the requisite capabilities to incorporate cloud computing service applications. This is primarily due to the presence of information technology departments within organizations, which possess the essential components required to operate cloud computing services, including servers, operating systems, and internet connectivity. Furthermore, organizations also have access to cloud computing service providers and the necessary financial resources to support such endeavors.

About the statements "the institution provides access to all Internet sites and social networks" and "the institution provides satisfactory use of the Internet," the approval rate of records managers (strongly agree and agree) was significantly higher at 69.5% compared to the satisfaction rate of 54.3% when only providing satisfactory access to all internet sites and social networks. According to the focus group participants, organizational infrastructure can incorporate cloud computing service applications. This is attributed to IT departments within organizations, which possess the essential components necessary for functioning cloud computing services, including servers, operating systems, and internet connectivity. Furthermore, organizations can access cloud computing service providers and financial resources to support adopting these applications.

A significant proportion of records managers (60.9%) agreed on the potential benefits organizations can get from utilizing cloud services offered by external providers, such as Google Drive and Gmail (paragraph 5). However, researcher argue that this perspective should be considered in conjunction with establishing appropriate controls mandated by the United States National Archives. These controls encompass the ability to substantiate the safety and privacy of data and ensure uninterrupted access to data and services (Weisinger, 2010).

Cloud computing applications are utilized within institutions for storage, accessibility, and sharing records.

The second question of the study sought to determine the extent to which record managers utilize public cloud computing services for record storage, accessibility, and sharing.

Table 8 The Extent to Which Record Managers Use Public Cloud Computing Applications

The Statement	Always	Often	Sometimes	Rarely
Use email (such as Gmail-Yahoo-Hotmail)	52	20	16	**17**
	49.4%	19.1%	15.3%	**16.2%**
Use Google Drive	26	28	25	**26**
	24.8%	26.7%	23.8%	**24.7%**
Share photos through web apps	24	27	24	**30**
	22.9%	25.7%	22.8%	**28.6%**
Manage files and records via web applications	23	30	28	**24**
	21.9%	28.6%	26.7%	**22.8%**
Use Google Doc	20	35	21	**29**
	19.1%	33.3%	20%	**27.6%**
Use Office Live	18	19	23	**45**
	17.2%	18.3%	21.9%	**42.6%**
Use YouTube	29	32	21	**23**
	27.6%	30.5%	20%	**21.9%**
Use other applications (such as Google Calendar, Google Translate, Facebook, App Engine, etc.)	37	22	22	24
	35.5%	20.5%	21%	**23%**

According to table 9, cloud computing applications and services used to store, access, and share records by records professionals in Omani institutions varied between always, often, and rarely. Statement 1 "Use email (e.g. Gmail, Yahoo, Hotmail)" and statement 8 "Use other apps (e.g. Google Calendar, Google Translate, Facebook, App Engine..)" get approval ratings of 49.4% and 35%. Outlook is one of the most popular applications for managing and storing records in organizations, except for the Ministry of Justice and Legal Affairs, which uses the correspondence system. This finding is also consistent with the finding of Bellin and Ekard (2022) that the most popular cloud computing applications among companies and organizations are: Google's G Suite, Microsoft 365, Box, Dropbox, and Canvas due to the range of solutions they offer.

While Statement No. 2 "Using file storage on Google Drive," Statement No. 4 "Using file and records management via web applications," and Statement No. 5 "Using Google Docs" received scores ranging from 26.7% to 33.3% respectively, it indicates frequency of use. This result is consistent with what (M8) emphasized in the focus group on using Google Docs to design work-related surveys and measure performance. (M8) pointed to the use of Google Drive to manage and save outgoing mail or correspondence data, and (M7) agreed with him and added that his organization uses Google Drive service for recording, tracking, and sorting project data. While (M9) indicated that he uses Google Drive to store publicly accessible records, such as terms of reference and decisions, for which there are no restrictions on saving copies.

Table 9 The Record Specialist Employs Cloud-Based Applications to Facilitate Records-Related Tasks, Including Saving, Retrieving, And Sharing.

Statement	E-mail	Google Apps	Microsoft Office	Amazon	Dropbox	Total	%
Storage and preservation of records	35	16	21	8	12	92	**87.6**
Save and manage e-mail.	52	11	18	9	0	90	**85.7**
Save record management applications and databases.	23	20	26	8	10	87	**82.9**
File sharing among enterprise departments.	51	10	12	8	10	91	**86.6**
Exchange of records with other institutions.	51	12	14	8	8	93	**88.6**
Share technical adjustment tools for records (classification plans, retention schedules, record indexes, …).	39	14	20	0	12	85	**81**
Providing beneficiaries with access to specific records.	35	22	20	0	0	77	**73.3**
Getting archived files electronically.	31	20	19	8	8	86	**81.9**
Access to the index or search tools of records	30	21	19	.	0	7.	**66.6**
Providing online training courses related to record management through the cloud.	29	22	16	10	0	77	**73.3**
Marketing and advertising of records department services.	41	14	14	11	0	80	**76.2**

The findings in table 10 demonstrate records management specialists' utilization of public cloud applications. These applications include email services, Google Apps, Microsoft Office, Amazon, and DropBox. The primary purpose of utilizing these applications is to facilitate record-related tasks such as storing, retrieving, and sharing information. Records managers predominantly utilized e-mail, Google Apps, Microsoft Office, Amazon, and Dropbox among the public cloud applications examined. Specifically, e-mail was the most widely utilized service (45% of usage). Microsoft Office followed with a usage rate of 21%, while Google Apps and Amazon were utilized by 19% and 9% of records managers, respectively. Finally, Dropbox was the least utilized application, with a usage rate of 6%.

The most frequently used record activities (saving, retrieving, sharing) used by record specialists on public cloud applications (email, Google Apps, Microsoft Office, Amazon, Dropbox) are sharing records with other organizations (88.6%), "record storage and preservation" (87.6%), file sharing between enterprise departments (86.6%), and email storage and management (85.7%). Moreover, the respondents indicated the use of Microsoft Office in "saving applications and databases related to record management" by 82.9%, "obtaining archived files electronically" by 81.9%, "sharing technical control tools for records (classification plans, retention schedules, record title indexes, searchlights...)" by 81%, "marketing and advertising of records department services" by 76.2%, "providing beneficiaries with access to specific records", "providing online courses", "Cloud record management intent" (73.3%), and "index access or online record search tools" (66.6%). The approach of record specialists in Omani organizations in their various activities and uses of public cloud applications is consistent with the North Carolina Department of Cultural Resources study (2012) that cloud applications can be used for a variety of purposes, including collaboration, communication, storage, access, or content delivery.

Concerning the organization adopting the cloud storage service for records and working to manage and operate it or seeking assistance from an outside provider, the study discovered a discrepancy and difference between the answers of the focus group sample members, as (M9) prefers that the organization adopt cloud storage ownership to protect and secure data. Moreover, (M5) indicated that the matter depends on the organization's infrastructure readiness. The organization can run cloud computing applications if it is available; otherwise, it can rely on an external provider.

The Advantages of Utilizing Cloud Computing to Store, Retrieve, and Share Records

The third question in this study seeks to determine the anticipated advantages of implementing cloud computing in record management as perceived by record specialists in Oman.

Table 10 The Advantages of Implementing Cloud Computing for Records Management as Perceived by Records Managers in Oman.

Statement	Repetition	%
Cloud computing permits multiple concurrent uses of records.	81	**77.1**
Expense reductions for management and maintenance.	63	**60**
Creation of joint data and record balances, exchange of services, development, and sharing of record collections (enterprise acts, reports, and bulletins).	59	**56.2**
Cloud computing offers a cost-effective solution by mitigating the need for purchasing software required and storage place.	59	**56.2**
Cloud computing is crucial for resolving the issue of saving electronic records or a portion of the issue.	59	**56.2**
Cloud computing does not affect records security if controls are implemented to achieve the security and confidentiality of records and information.	54	**51.4**
Cloud computing provides unlimited virtual storage capacity that can be increased at any time at additional prices.	50	**47.6**
Possibility of building a virtual repository to save records (outgoing and incoming official correspondence).	50	**47.6**
Opening a participation and cooperation channel with other institutions for the exchange of experiences and official communications.	50	**47.6**
Linking the service to the institution's official websites and social media pages for marketing and informational purposes.	50	**47.6**
Cloud computing enables free applications.	45	**42.9**
Accessing files and using applications without the need for the availability of applications on the user's device.	36	**34.3**

The above Table (11) and the focus group indicate that the benefits of cloud computing for organizations in Oman include the ability to store, retrieve, and share data. Statement No. 1, "cloud computing provides simultaneous multi-use of records," received the highest level of benefit, followed by Statement No. 2, "cost savings in management and maintenance expenses," which was also confirmed by (M7) in the focus group on the role of cloud computing in reducing costs.

Statement No. 12 states that the security of records remains unaffected by cloud computing if appropriate controls are implemented to ensure the security and confidentiality of records and information received the least scour, which reflects the records manager's awareness of cloud computing benefits in saving, retrieving, and sharing records and its role in reducing costs and achieving security and confidentiality of data and information in their organizations. The conclusion aligns with the viewpoint of the focus group, emphasizing that cloud computing applications have the potential to offer a secure data environment with standardized protocols and controls. One participant (M1) highlighted the importance of security managing by experts and thorough testing of these applications. Another participant (M5) emphasized the necessity for specific conditions and controls, including the requirement for servers to be located within Oman and subject to direct supervision, monitoring, and control.

The choice of records managers for statement No. 1, "cloud computing provides simultaneous multi-use of records," is consistent with what the Newa study (2017) confirmed, namely that cloud computing enables employees to access their files and data regardless of their location or time, and that this is one of the most important features of cloud computing applications.

Figure 1 The Advantages of Implementing Cloud Computing for Records Management as Perceived by Records Managers in Oman.
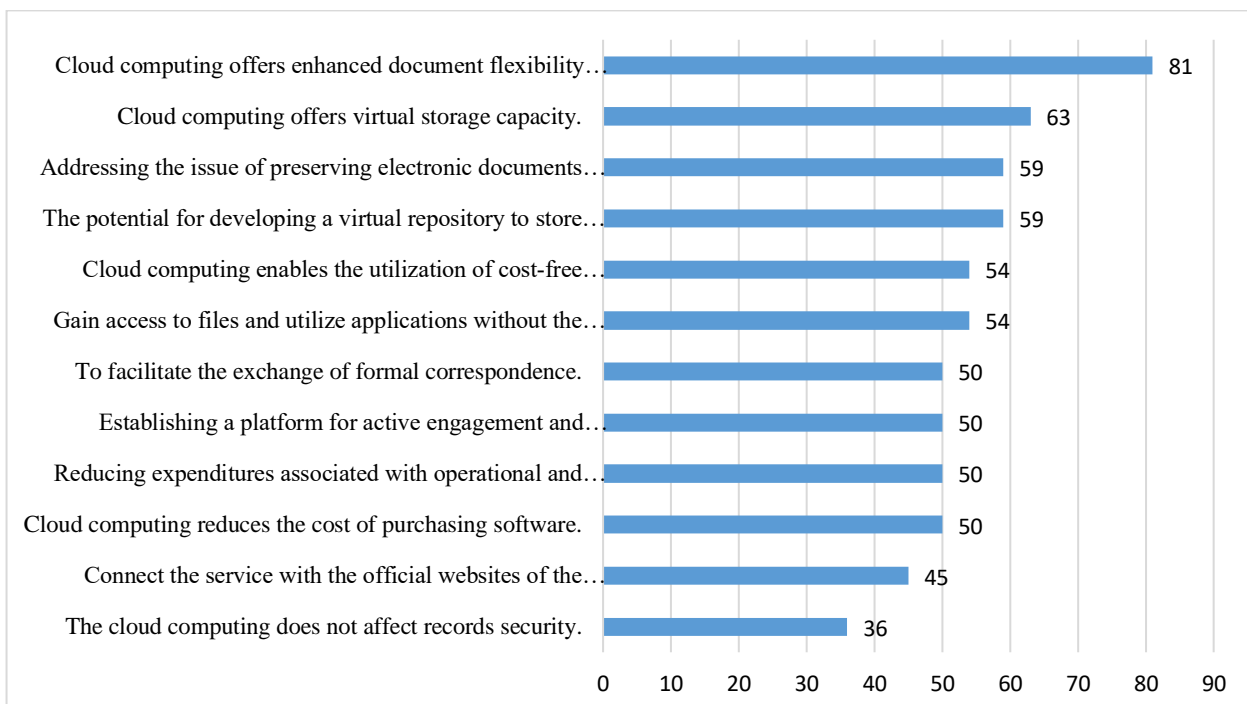
Challenges That Omani Institutions May Face While Saving Records in The Cloud

As shown in table (17), the fourth question of this study sought to identify the challenges that may prevent the use of cloud computing for storing, retrieving, making available, and sharing records from the perspective of records managers in Omani institutions.

Table 11 Challenges Institutions Face When Saving Records in The Cloud from A Records Manager's Point of View

Statement	Repetition	%
Lack of training courses to develop cloud computing application skills.	87	**82.9**
Lack of knowledge among specialists and beneficiaries.	62	**59.1**
Internet service providers maintain an online copy of the Department's files despite their deletion by the responsible party.	57	**54.3**
Lack of security for the protection of information confidentiality.	57	**54.3**
Concerns about loss of records in cloud computing.	52	**49.5**
Infrastructure management by the cloud provider.	47	**44.8**
Slow process of retrieving information.	47	**44.8**
Many leaders doubt cloud computing importance.	47	**44.8**
Cloud computing requires constant software and app updates.	42	**40**
Weak technological infrastructure and the fear of internet outage issues impede cloud accessibility.	41	**39.1**

According to Table 12 and the focus group, the most significant challenges organizations face when storing records in the cloud, from the perspective of records managers, are the lack of training courses for developing the skills of applying cloud computing (82.9%), the lack of knowledge among specialists and users (59.1%), and the internet service providers' keeping copies of the records department files on the internet despite being deleted by the administrator (54.3%). In addition, 44.8% of leaders didn't believe in the importance of implementing cloud computing, and this result was consistent with what the participants indicated in a focus group sample, where they highlighted a disparity between organizations in terms of leaders' lack of conviction in the importance of implementing cloud computing and the cloud provider's control over the infrastructure. As for the weakest challenges of applying cloud computing systems to record management, from the perspective of records managers, the need for cloud computing to update programs and applications constantly was by 40%, while poor technology infrastructure and fear of internet connection issues, which makes accessing the cloud difficult, was by 39.1%. Concerning the financial challenge, the focus group sample confirmed that there is no financial issue in using cloud computing for storing and accessing records; the fact that the government supports the trends of digital transformation in institutions; and the fact that senior management plays a clear role in facilitating the process of attracting cloud computing applications because they are decision-makers whose decisions are considered. The choices and arrangement of records managers for the challenges that institutions may face in implementing record management systems are consistent with the findings of some studies, such as the study by Bromage and Stuart (2010) that the records managers should base their decision to include the cloud in the way they manage institution-owned records on an analysis of risks of the institution's information, the cost of storing records in the cloud, and the security of cloud-based storage.

Study Recommendations

Considering the discussion of the results analysis on cloud computing applications, their benefits, and their challenges from the perspective of the study sample of records managers in the Sultanate of Oman, the researcher recommends the following:

- Enhance the awareness and understanding of record management professionals and employees in Omani institutions regarding cloud-based record management systems. This includes training them on the potential advantages of such systems, such as cost reduction, enhanced record security, and improved accessibility at the enterprise level. To achieve this, it is proposed to establish training programs and workshops specifically designed for records managers to effectively and efficiently manage records using cloud computing and modern technologies. The more decision-makers and officials are aware of the importance of cloud solutions for managing records, their methods of application, and the controls for achieving secure access and making them accessible, the more they will insist to implement and rely on them.

- Update the study plans of the qualification programs of record specialists in Omani academic institutions with courses on modern technologies related to the management, preservation, and access to records and archives; to raise their knowledge and applied skills in using these technologies in enhancing the services provided to officials and the public related to records and administrative information.

- Develop and implement a comprehensive audit system to ensure data storage, protection, and use in accordance with record management practices approved by the National Records and Archives Authority, which serves as the national archives of the Sultanate of Oman.

- When utilizing a cloud service provider, consulting with those responsible for some related activities in the institution, including those responsible for information technology, record management, and legal and administrative affairs, is necessary. Moreover, the records created, stored, and managed in the cloud should be subject to archival legislation that regulates record management activities and disposal.

- Providing financial and technical assistance to record departments within institutions to effectively implement cloud-based record management systems, which rely on information and communication technology.

- Enhancing collaboration and coordination between information systems and records departments within Omani institutions, to facilitate effective implementation of record management applications in cloud-based environments.

Conclusion

This study examined the usefulness of implementing cloud computing applications as a technical solution for enhancing record management systems in Omani and Arab institutions. It explored the advantages and challenges associated with this procedure, specifically from the perspective of records managers. The study revealed that cloud computing offers diverse services within the realm of record management systems. The adoption of cloud-based record management systems has the potential to prompt institutions to review their priorities regarding information protection and sharing. When evaluating record management solutions in the cloud, we must remember that the cloud, to be a model for record management of the institution, must be preceded by good planning to get benefits from its advantages and overcome the challenges and difficulties related to the financial, technical and human aspects necessary to implement effective and efficient record management systems in the cloud.

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