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Information technology management: Application, effects and challenges of electronic document management system (EDMS) in the education sector

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Article Info

Abstract

Most organizations are still using the old traditional methods of storing documents in the file cabinets of which it might not be easily accessible when retrieving an old document for future work or reviews. This method consumes paper and space associated with paper filing systems, also this traditional document management system allows the use of unauthorized users and insecurity of document storage. As a result, this work analyzes the application of EDMS. It assesses the effectiveness of its implementation on information management especially within the educational sector. The analysis and selection of tools for the documents management systems are carried out. An EDMS often becomes one of the required tools for files documentation and management. Therefore, considering an EDMS is necessary in every organization for creating, keeping and organizing and technical control of data. In this study, system requirements and software design were examined; a computer-based application was created and effectively implemented. The creation of an EDMS sets it apart from other data management systems in that the organizational structure is sufficiently customized to be changed in response to a system administrator's request. Additionally, the security level of archived files is raised, and an existing digital signature technique is modified, increasing the organization's level of productivity.

Keywords: EDMS, Information Management, Software Design, Data security, File Documentation

1. Introduction

These days, document-based information is managed throughout its life cycle using document management systems (DMS). Numerous studies have been conducted by researchers around the world to compare the performance of users of paper-based document management systems (DMS) and an EDMS (Anderson, 2012; Noyes, 2008) [2, 7]. These studies have demonstrated the benefits of recently developed electronic systems. Many sectors have switched from paper-based document management systems to electronic systems when new technologies have evolved because it makes administrative job easier through file integration and control. According to earlier studies, an electronic DMS has several benefits, including budgetary, management, privacy, systems integration, security and performance, (Abdulkadhim *et al*., 2015) [1].

Electronic document management systems are designed to make it easier to handle papers that are relevant to certain businesses, initiatives, and work groups within computer networks. EDM systems go beyond the fundamental file management features available in operating systems by including sophisticated functionality relating to the life-cycle and versioning of particular classes of documents. EDM systems frequently treat the papers they move around as "black boxes," much like the post office has little interest in what is inside the envelopes it keeps moving around as long as the mail reaches the right recipient in time. From the perspective of document management, it is essential to distinguish between the fundamental information included in a document and the secondary information about the document. Users of document management systems and regular people can find, retrieve, and access documents thanks to metadata, sometimes referred to as secondary information.

Earlier, the document itself had meta data in the form of cover pages, drawing headers, etc. Metadata is ideally suited for storage in data bases that make searching easier in the modern digital environment. Early document management systems had their own user interfaces and separate networks. Putting together the technical infrastructure was frequently exceedingly challenging. Since the second half of the 1990s, as the Internet became widely used, almost all EDM systems have switched to using the general Internet as their physical network, web servers as its storage medium, and web browsers as their major platform for developing user interfaces. As a result, client-side software installation is frequently no longer necessary, and using an EDM system has a very low barrier to entry. These systems are provided by third parties as ASP-services; some of them were built internally by project participants (application service providers). The terms "document management system," "project extranet," "project web," "project bank," "project specific web site," "document pool," "project information management system," and "virtual project" have all been used to describe these systems.

2. Concept of electronic document management
Before the Internet, intranets, and networks were invented, information management had a completely different concept from document management. It is now described as a process to initiate, store, edit, retrieve, and displaying of data Abdulkadhim et al., (2015) [1]. The traditional definitions and uses of documents have been put to the test by these technological advancements. According to Asogwa, (2012) [3], the transition from paper-based documents to electronic web content fundamentally altered how users were managed in terms of managing not only the web content itself but also the users who created the web content. Early information management systems were created as a result of this, and they were able to manage and regulate content repositories, delegate administrative chores, create and author templates, handle file transfers, perform searches, and manage workflow Asogwa, (2012) [3]. Enterprise content management evolved as a result of the information revolution, which was fueled by the development of the information society and highly sophisticated ICTs. Improvements like automatic email capability support, record generation, strong analytical tools, record classification, sorting, and storage becoming ubiquitous challenged the traditional definitions and uses of documents in corporate or government offices, as well as the educational sector Hung et al, (2015). In everyday speech, a "document" is a carrier of information (often paper-based) that contains written or drawn information for a specific purpose. The ability of any document to be moved, saved, and processed as a single entity is typically essential to the concept of a document Ostroukh et al (2014) [8]. As a result, a sizable amount of the documents used in today's business environment are kept as discrete computer files, which the operating and email systems treat as distinct entities. Using a number of different generation processes is currently required while handling papers in the construction industry. Most document are now prepared electronically, but many are still printed off and sent to the other parties through email or courier usually with the assistance of copying companies acting as middlemen. A little more advanced method involves producing and transferring papers digitally through e-mail attachments and other transfer/sharing means. This expedites the transfer of documents, but in terms of document management, it scarcely represents an advance over the current situation because it may be more challenging to locate a document on another person's computer than on his shelves. Asking someone to provide a document is frequently a final resort when retrieving one. Currently, the most complex method is the usage of document management systems, where documents are housed centrally on a webserver and users communicate with this central repository through interfaces made using standard web browsers.

3. Characteristics of electronic document management
Therefore, any organization in the education sector should implement an electronic DMS to have a successful management and administration system. The system possesses three key traits while taking into account the general requirements of an Electronic DMS which comprise:

- Management: This function was added to the system to make it easier for users to do their jobs. They can quickly obtain needed files and search for those files using a variety of parameters. Additionally, this system's performance is improved by using a few approaches as users analyze data.
- Security: Digital signatures have been used to validate documents and regulate user access. In this system, the creators' and users' identities are recorded and maintained alongside the digital content to ensure non-repudiation and the preservation of the digital content's history.
- Control: To regulate user, document, data, access, backup, and restore, a variety of control mechanisms have been deployed. The objective of the project is to develop a DMS application that companies can use to switch from disorganized, manual systems to organized, affordable electronic systems.

4. Application areas of electronic document management
Electronic document management is defined as a collection of data that includes many sorts of documents that may be reside throughout a network and support multiple simultaneous accesses, updates, and modifications. Some of its application areas are listed below.

- EDMS are used in several organizations all around the world. It has helped organizations succeed in terms of management strategy, budget, anti-corruption, security and privacy, user requirements, collaboration, and system integration (Hung et al, 2015).
- According to Ostroukh et al (2014) [8], EDMS can be utilized to assist firms in running more productively by reducing transaction costs, increasing capacity, automating procedures, eliminating errors, and saving on manpower.
- Public and governmental entities have employed EDMS. In the early 2000s, the number of EDMS implementation studies in the government sector increased Haitham, Chiong, & Sao (2016) [4]. Government enterprises are increasingly using technology to improve business procedures generally, increase efficiency, and save space.
- Using EDMS to revolutionize how services are provided to customers and organizations Hwang (2013) [6].

5. Electronic document management in education sector
An educational institution's electronic document management system (EDMS) is very helpful for managing information,

particularly records pertaining to students. At order to examine records management and archive procedures in educational institutions, Hwang (2013) [6] conducted a research in order of how to execute the records and archive operations in accordance with the procedures and principles of records and archives administration, a model is therefore suggested for some institutions. Additionally, utilizing the web-based infrastructure of EDMS, Haitham, Chiong, & Sao (2016) [4] have created an application model for the University that is accessible throughout a day. Any mobile device with internet connectivity, including a PC, laptop, or tablet, can be used within or outside of the university to access the created system. Digital signature is advised, although security level of documents within the system was not fully implemented. This program created for polytechnic institutions that uses digital signatures has addressed this security issue.

6. EDM System Architecture

Analyzing prior studies and combining different concepts have helped create an effective EDMS that can be used in a learning environment. In addition, the design of the created system took into account the needs of the company and fresh ideas. Numerous individuals from various organizations were interviewed for the purpose of gathering requirements and analyzing data, and existing documentation from those businesses were taken into account while analyzing and designing the new system.

Thirty users in twelve departments have used the desktop program that Polytechnic University's computer science department built. The system is created based on predetermined needs of the institution's administrators and personnel. In response to user requests, new functionalities were added to the system and already-existing functions were updated.

6.1 Information Management

The suggested EDMS system's design is depicted in Figure 1. The three modules that comprise system are also described in the figure 1.
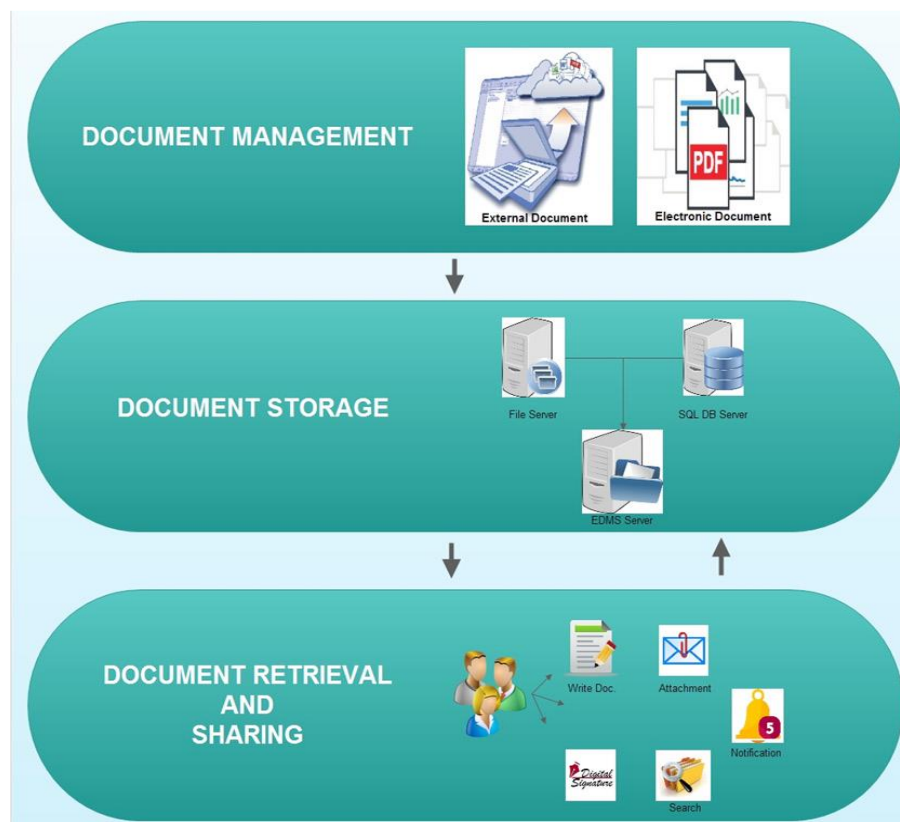

Fig 1: Proposed EDMS architecture

a.   Document management

The designed system has two methods for managing papers.
(i)   Hard copy papers from outside sources can be sending to the computer system electronically.

The purpose of this concept is to manage papers that might originate from an outside business that has not yet switched to an electronic system. The dean of the school first receives the outside materials before sending them to the other departments through the department heads (Manager). A new feature called document notation has been added to this system to assist file sharing.
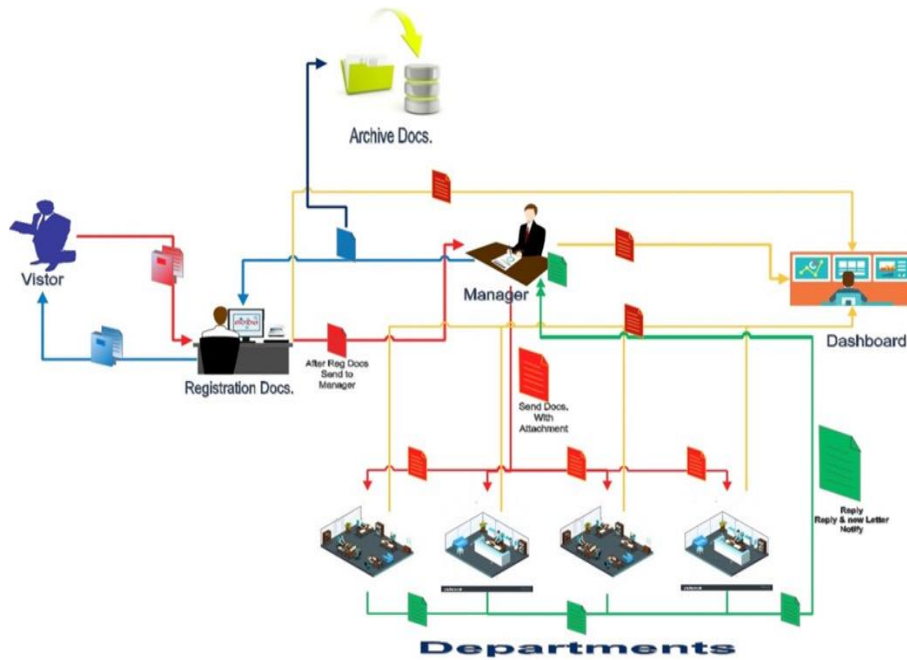
Fig 2: Document Management (External)

(ii) System users can still produce internal documents. Once the document has been created, its content will be assigned in a table, saved, and archived. This table can later be used to determine whether unauthorized users have edited the document.

b. Document storage
In this arrangement, documents are kept on two servers. A file server is used to hold documents that have been copied in the form of PDF files by a system user. While the database server is used to hold system data then run the complete system there by improving system security and archiving.

c. Document retrieval and sharing:
With this system, users can create, search for, send, edit, and report, attach, route, and approve documents, among other tasks.

6.2 User Management
User profile management is a feature of the User Management System. It offers categorization and uses user authentication. User identification numbers, email addresses, first and last names, and other details are included in user profiles. In order to access the user profile for reading and editing, user ID is used for authentication. User information for authentication includes the user's name, user id, and password.

The user management flowchart and associated system features are shown in Fig. 3 below.
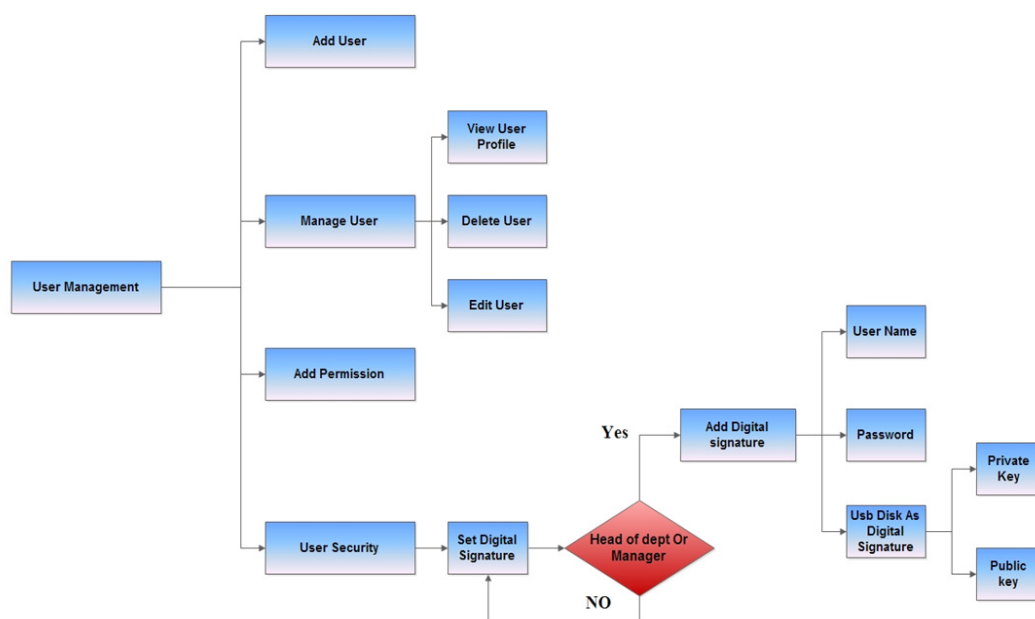

Fig 3: User management flowchart

The following characteristics are a part of the proposed system user management

- Add Users: There are three different user kinds in this system: managers, secretaries, and administrators. Depending on the rights granted, each of them is accountable for particular acts. Users can be added by administrators to departments within their organizations. New users can sign up to be a department's manager or secretary.
- Manage Users: Current users may be changed or eliminated at any moment.
- Access rights: User rights vary according to the user's role and the department to which they are assigned. Based on their duties, various permissions have been given to the various user kinds.
- User security: Each user has two levels of security in place. User authentication, which is the first level, is supplied through usernames and passwords for system access. For users who are permitted to utilize an electronic signature, the second level combines user authentication with external hardware.

7. Methodology

The approach, application, and testing of the system are presented in this paper, along with a number of functions that are useful to any organization in switching from a traditional paper-based document management system to an electronic system. A department head will have three key features when given access to the system: notes, internal documents, and incoming documents. Users can remark on a particular document using notation, and the internal document option shows all documents that have been created within the organization. Additionally, the functionality for incoming documents shows every document that has been obtained from other organizations. A typical user will only have access to notes and internal documents.
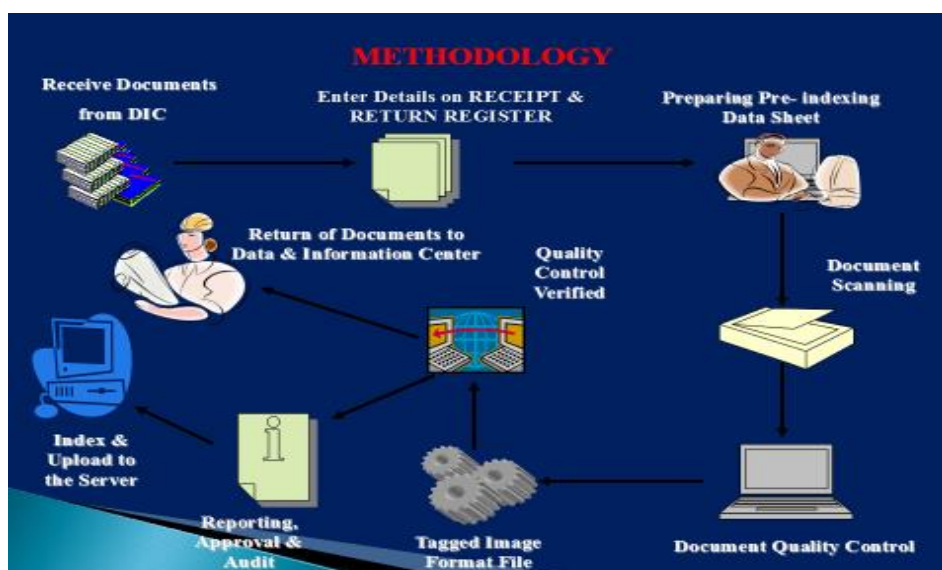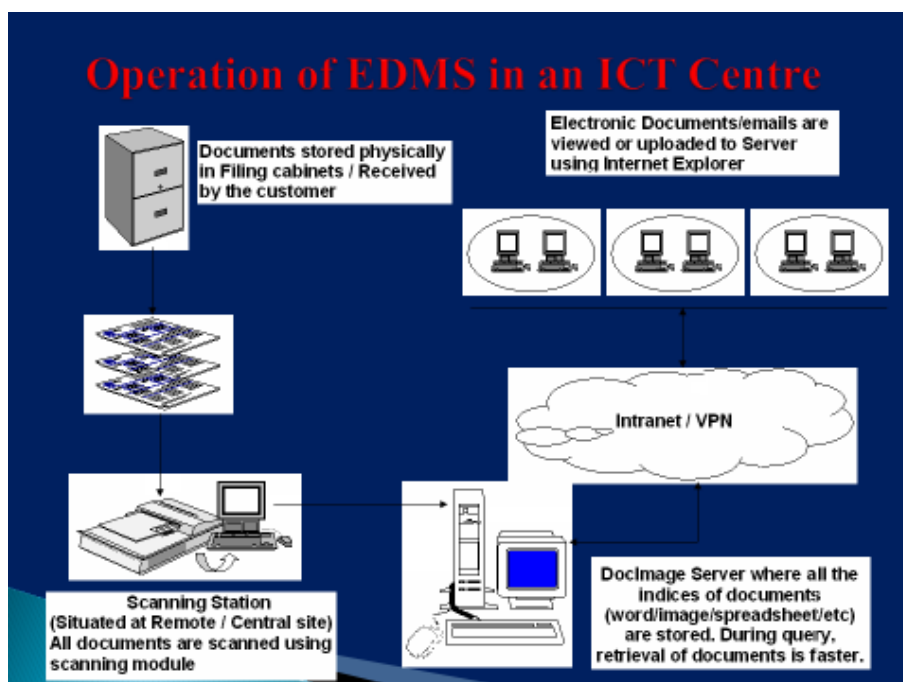

Fig 4: Methodology of EDMS

Fig 5: Implementation of EDMS in ICT center

7.1. Handling New Document

The system manages document in two approaches: the processing of hard copy documents and the creation of softcopy documents.

- **Paper documents (External documents)**

This type of document originates from outside the company, and it goes through several processes, including document scanning, which instantly changes it to a PDF format file with necessary file identification.

- **Making new documents (Internal documents)**

Only the departmental secretary and head of departments have the ability to produce new documents within the system for the company. Each brand-new document has the following specifications:

- **Digital Signature**

Sending Documents with a Digital Signature Sending papers requires some authentication in this system, and only the heads of the departments are allowed to do it. The means of authentication that are used to verify user permission are distinct from the means of authentication used to log in. Additionally, every department head needs to have a disk drive with their private keys on it so they may use it to sign documents before forwarding them. Digital signatures are used in combination with hardware and user authentication to ensure system security as a result.

8. Benefits of EDMs in the educational sector

EDMS has a lot of benefits. It is created particularly to satisfy the institution's requirement. Secondly, without the assistance of the software developer, the structure of an institution can be modified to reflect the changes that the management find necessary. Thirdly, any educational institution can use the designed system because it is user-friendly. Last but not least, it offers a variety of additional functions that are included in every EDMS, such as cost-savings, dependability, and document security through the use of digital signatures.

8.1. Benefits

1. It raises employee productivity
2. Lower the price of manual document production
3. Encourage knowledge and information sharing
4. Improve corporate governance and transparency
5. Instantly send files via fax and email
6. Access information while on the road

8. Conclusion

In conclusion, an electronic document management system (EDMS) reduces expenses for educational institutions by automating tasks, boosting document security, and reducing human error. This article demonstrates the use of an electronic document management system. The EDMS gives users its users an easy way to view, share and manage their documents while adjusting some security and management elements. The system takes into account the support of heterogeneous client devices and gives users the ability to alter, share, and synchronize. Every activity taken within the system will also be audited. This feature guarantees data integrity and guards against data loss. The functionality of this program can be increased by integrating new sections for student registration, versioning, and human resources. Furthermore, the hardware for digital signatures can be used

to identify users of the system that holds all user data.

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