INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN MULTIDISCIPLINARY EDUCATION
ISSN(print): 2833-4515, ISSN(online): 2833-4531
Volume 03 Issue 03 March 2024
DOI: 10.58806/ijirme.2024.v3i3n19, Impact factor- 5.138
Page No. 393 - 401

SMS-Based Inter Campus Communication System of Isabela State University – Ilagan Campus

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ABSTRACT: Rapid advancements and technological breakthroughs have revolutionized the spread of information and communications. The development of technology has significantly altered the transmission and storage of information. The widespread use of computers has revolutionized numerous businesses and sectors worldwide. Computers affect how employees can improve their work for every client. For example, offering their services in a way that is more accurate, efficient, and competitive when providing information. To carry out their work tasks, they may use a variety of programs or software. As a result, the manual is still the standard procedure for document recording, including the distribution of memos and communication letters to specific recipients or across offices using record books. Therefore, they might encounter challenges in the assigned personnel carrying out their duties during this process. So, the study's goal was to create a paperless communication system that would make it simple for the recording officer to find, distribute, and alert recipients—whether or not they had a cell phone. Every stage of the waterfall model was applied to the development process for the system. The respondent assessed and tested the system, and found that it met the requirements for sending outgoing and incoming memos and communication letters to the intended recipients.

KEYWORDS: SMS Based, communication, information, dissemination, waterfall model.

1 INTRODUCTION

The existence of computers has been globally transformed in many establishments and industries. Computers gives an impact on the way of improving the work of employees for each client. Such in executing their services to be more competitive, efficient, and accurate in giving information.

Avers that communications and information spread have been revolutionized by technological breakthroughs and rapid advances [1]. Technological development has greatly changed how information is stored and transmitted [2]. Industrial society has progressed into an era of advanced technological innovations, thereby affecting the way people live their lives and how organizations run their daily business activities [3]. Technology is permeating people's lives like never before. It is being used in all spheres of life such as health care, education, agriculture, the banking sector, information seeking and retrieval, energy, manufacturing, and transportation [4]. At the center of all technological developments is the growing use of the Internet and mobile technologies. The digital information era has brought incredible advances in computing and communication technology, the advances that have made possible the advent of new methods of communication, such as web and email, and their penetration in all spheres of our lives. Increasingly accessible electronic communication is changing the way businesses work and people live. The spread of the Internet reaches almost all parts of the world, and even in space astronauts can read and send email messages [5].

Sharing information would not only raise awareness and increase knowledge but could also save lives. Occasionally, governments need to provide critical information to citizens accurately and promptly. There are different information dissemination channels such as Television, Radio, SMS, and Social Media. However, these channels have several limitations [6]. A dissemination approach is needed that intelligently targets specific citizens with critical information that concerns them from trusted sources on time. Dissemination information is a novel idea of information dissemination by integrating many trusted sources in a unified source that can be accessed by the stakeholders at any time [4].

Since the existence of Isabela State University, Secretaries and Administrative clerks of the different offices have begun the process of distributing memorandum and other communication letters. Uses a variety of procedures, and locates offices distributing. As a practice, the process of keeping the memorandum and other communications are filed into a filing folder or filing cabinet and recorded in the record book. Initially, the process is just quick and easy, low cost and minimum training is needed since the process is not too complicated but keeping and accessing the documents is not secure. Also, it may not be determined whether the recipient received or not the said documents.

Nevertheless, with the advent of technology, the proponents have seen that there is a strong need to computerize the process. It was observed that if someone asks for a copy of a memorandum they cannot locate easily, there is a tendency to lose. Likewise, since it is using the traditional or old practice, there is no way for backup. Accessing the previous documents (memorandums or any communication letter) especially the previous months/years is difficult and time-consuming.

With the given situation, it is recommended to revolutionize through an SMS-Based Inter Campus Communication System as a digitized way of informing and distributing memorandums and communication letters. The system automatically disseminates, records, and safely the issued documents. It responds to the hectic task of keeping everything written down keeping records sound and safe and locating authorized personnel in giving or distributing memorandums. It manages records, eliminates inaccuracies, and improves efficiency in the institution. It also provides details of full information to the personnel and staff concerned about the campus.

Hence, the **Paperless Communication System** gives a more professional appearance to enhance the services of the institution to everyone.

2 RELATED LITERATURE

2.1 Document Management System

The document management system is the automated control of electronic documents images, spreadsheets, and word-processing documents through their entire life cycle within an organization, from initial creation to final archiving. It allows organizations to exert greater control over the production, storage, and distribution of documents, yielding greater efficiencies in the ability to reuse information, control documents through workflow processes, and reduce product cycle times. DMS is an electronic system that scans, stores, and retrieves documents received or created by an organization.[7]

Paperless Document Management System is used to eliminate the losses that businesses suffer because of physical paper files and filing systems. This paper addresses some of the technologies that are helping professionals shift toward a paperless business world, a DMS based on organizing digital documents to search and store documents and to reduce paper. Most of the workplaces consist of a variety of documents having a mixture of handwritten and printed text. The detection of such documents is a crucial task for Optical Character Recognition (OCR) developers. This paper describes different steps for processing different documents using scanning, tagging, and indexing for effective data retrieval with OCR and Indexing techniques [8]. Compared the document management systems with printed papers. The advantages

and disadvantages of both systems are listed as a table. It stated that signature is the most important problem in the document management systems and this problem is solved by using biometric signature [9]. Also, they discussed the overall architecture of EDMS and how organizations can integrate the EDMS to their systems. Although the majority of universities all over the world use of computer based system, universities maintain their document management using a semi-automated system or paper today [10]. Generally, document management systems are designed by using a database. However, worked on a document management system according to ISO 9000 standards by using the XML structure of the new browser-based language [11].

Organizations produce a large number of documents in several types and there is a real challenge in managing and effectively using of produced documents. Two main targets of document management systems were mentioned in their work. First target is accessing a document at anytime, anywhere and on any machine; second target is sharing a document with other users and enable them to make changes on document content at the same time. Ensuring the safety of the system is one of the most important issues today [12]. Database is the most important component of an electronic document management system so the security of the database is crucial for the system security. The biggest difference between TEDMS and EDMS is the MLS database used by TEDMS systems.

the advent of information technologies, a lot of important official documents and materials is sent through the internet. He mentioned about the details of electronic signature that is used to provide safety, integrity and to ensure the sending/receiving action cannot be denied. He also discussed the impact of electronic signature technology on the document management systems [13]. Document Management System (EDMS) can be described as a system which starts with preparing documents in computers or uploading prepared documents to computers; continues with saving the document header information (document name, document editors, document type, document date, subject, abstract, page number etc..), making changes on the document and sharing the document with different users; ending with archiving the document and based on the principle of managing all of the stages [14].

2.2 Records Management System

Developing any software system, the database normalization helps to avoid data redundancy. While when we automate database, it is easy for normalizing data. The essence of data normalization is to split your data into several tables that will be connected to each other based on the data within them. By designing database tables carefully, we save space, minimize duplication, protect the data to ensure its consistency, and provide faster transactions by sending less data [15].

Record Management is the supervision and administration of digital or paper records, Regardless of format, Records managements seek to efficiently and systematically control the life cycle of records that are routinely generated as a result of activities and transaction. “Records are a vital asset in ensuring that the institution is governed effectively and efficiency, and is accountable to its staff, residence and the community that it serves. Records support decision making organize documents, and provide evidence of policies”[16].

Extensive use of computers in a various application, a computation of bank statements, the use of robotics machine to speed up some factory works, enrolment and grading system in school and universities, networking and others. Man slowly realized the importance of computer to speed up communication even in remote areas and as means of transferring data for business needs. Computer can also store information in a mass storage device. It can recall information in a speed of microseconds or even nanoseconds. Therefore, man can easily retrieve store information, change it and then store it again [17].

Management System attempted to convert the existing filling system into a database filling system. The study begins with the analysis of the data present system and identifies problems that are encounters such as time consuming a costly process, and duplicated data files, difficult to provide information are difficult to control. That’s why she made this to have more efficient one in form of database that will help to maintain an operating procedure for maximized efficiency, to aid in retrieving, to have quality output and effort, to provide better utilization and allocation of human effort and labors, to eliminate duplication and redundancy of data, and to all the users to easily obtain information they need [18].

The need for record management programs to be implemented as standard operating procedure in any government agency is best evidence by real world specific example of how poor records management ended in disaster for companies such as enro. This section examined several scenarios of how records management practices affected agencies companies and other businesses 19]. The important issue in paper-based records is, all the clinical information is written in freestyle, and chances are high of missing or forgetting some important information, as this will lead to serious effects on patient’s treatment and care. The case sheet is a hard copy that can be accessed by one person at a time and needs physical transfer for other physicians to access. Retrieving a record will be a hard task given the number of medical records present and missing a record won’t be a surprise in a huge pile of paper-based medical records. Moreover, with time, information in paper records gets diminished because of aging paper and ink, even fire accidents or natural disasters can ruin the archive of paper records [20].

All the above-discussed issues can be overcome by implementing the EMR/EPR system, it can not only solve the problems but also improve the efficiency of healthcare by increasing accessibility, and needs fewer resources to maintain records. EPR system can be used as a resource of researchers, it will be a tool for disease surveillance, which can be used for public health initiatives and for practicing Evidence-based medicine [21].

2.3 Information Dissemination Systems

Information Dissemination Systems to describe systems that deliver individual copies of the same data from one source computer or a cluster of computers to client computers (subscribers) via the Internet. Although we concentrate on developing methods for efficient delivery of data from one source to multiple receivers, our results can be applied in cases where more than one group member can be a transmission source. For example, a straightforward extension to multiple sources is to construct a dissemination system for each source separately, and then use a combination of these systems, assigning each source to the corresponding dissemination system [22].

The impact of information dissemination on development is a long-term achievement, the dis-semination of development information through a Rural Information Strategy has the potential to make an impact on community development. The contribution of the Information Facilitators was an important factor. Where they were pro-active, with an active programmed for leveraging the flow of rural development information through various communication channels, impact was high. Where the Information Facilitator was more passive, concentrating mainly on reading room services, the level of impact was low. This suggests that the skills of information workers require revision, to incorporate managing development information flows and facilitating the use of information, if they are to become credible players on the rural development stage [23]. The flow (extension) of development information in society depends on the information environment. It was found that where the production of certain types of information was low, this led to low supply and consequently low impact (for example, in the area of income generation). This suggests the need to identify information gaps and assemble or repackage appropriate information to address the shortfall EDMS has transformed documents, accelerating and automating them. Computers and Web based information systems enable documents to be digitally created, stored, transported, and displayed. For the most part, computer systems have created documents in electronic format and incorporating multiple formats such as word processing files, spreadsheets, graphics, video, audio, and bit-mapped images. Webbased information systems enable documents to be shared by many users inside and outside the organizations. EDMS helps people to find the documents they are looking for without knowing the exact location of a document [24]. Document management reduces the uncertainty about whether the documents are up-to-date. It also eliminates redundant data or files. An electronic document management systems releases personnel from handling papers to more important work. Many document management systems also provide good distribution features.

3. METHODOLOGY

3.1 Waterfall Design

The study follows the Waterfall Model design as shown in the figure 1 for the software development and methodology employed in this investigation. The process starts with the communication phase, in which the researcher lays out the specifications. From there, it moves through phases such as planning, modeling, building, and software deployment

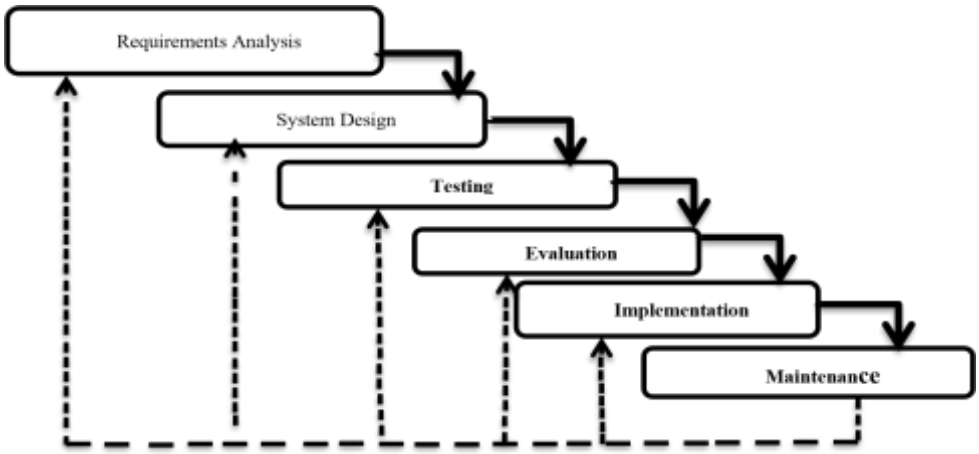

Figure 1. The waterfall model design of the developed system

3.2 System Architecture

Figure 2 shows the system architecture of the developed system. Wherein, the hardware and software requirements are identified during the development of the system to check each capacity. So, the system used at least the hard disk of 900 GB, 4.0GB for memory, and, Intel Core for Processor. Also, an Epson printer with a scanner that will be used to scan documents, a TP-Link Router, and a GSM unit. Visual Studio 2017 as the front end and My SQL as the back end of the system.

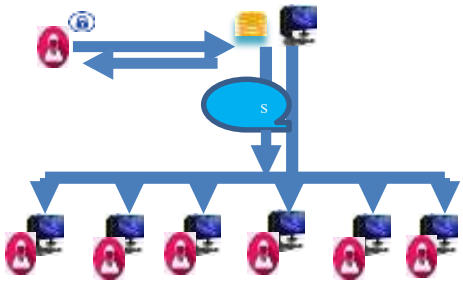

Figure 2. System Architecture of the system

3.3 Context Diagram

Figure 3 shows the context diagram of the developed system. The admin is the main user wherein, it has the privilege to access and manage the developed system. The system will be implemented in each head of the different offices to facilitate internal and external communication.

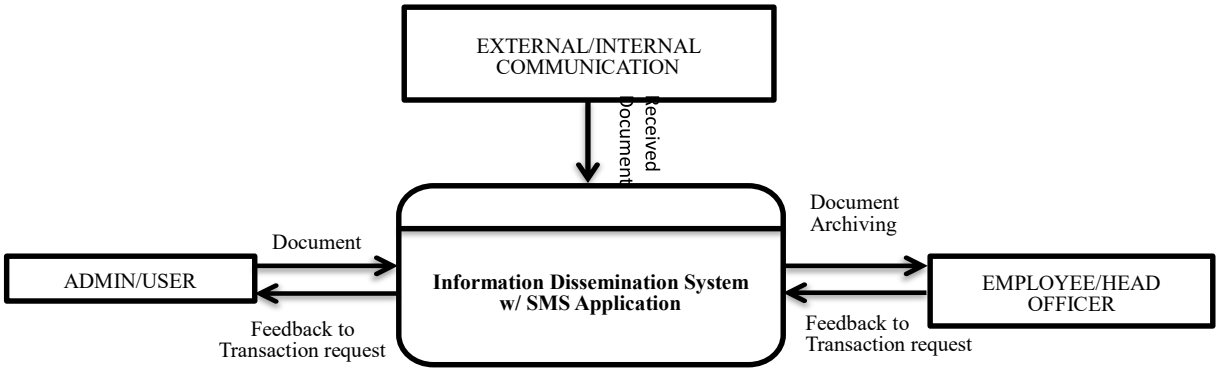

Figure 3. The context diagram of the system

3.4 Respondent of the Study

The respondent of this study is the group of ISU Employees as shown in table 1 that used for the testing of the developed system to determine if it is favorable or not. They are the ones who are knowledgeable enough to answer the problem posed in the present study.

Group	Frequency	Percentage
ISU Employee	10	66.67%
IT Experts	5	33.37
Total	**15**	**100.00**

Table 1. Profile of the Respondents

Statistical Treatment

To find the weighted mean, the following formula where used:

$$X = \frac{f(1) + f(2) + f(3) + f(4) + f(5)}{N} \quad 1$$

Where:

X = Weighted Mean

F = Frequency

N = Number of Respondent

To interpret the weighted mean, the scales below as indicated in table 2 were used with the corresponding descriptive interpretation.

Scale	Weighted Mean	Descriptive Interpretation
1	1.00 – 1.80	Strongly Disagree
2	1.81 – 2.60	Disagree
3	2.61 – 3.40	Neither Agree/Disagree
4	3.41 – 4.20	Agree
5	4.21 – 5.00	Strongly Agree

Table 2. Likert's Scale

4. RESULTS AND DISCUSSION

Development of SMS-Based Inter-Campus Communication System

The system improved the process of disseminating memoranda to the different offices.

Figure 3. Sending Documents

Figure 3 shows how to send documents. First, select an office where the documents whom to be received. So, the record officer may not go from office to office to distribute or send a memorandum or any kind of document that needs to be disseminated in a particular office.

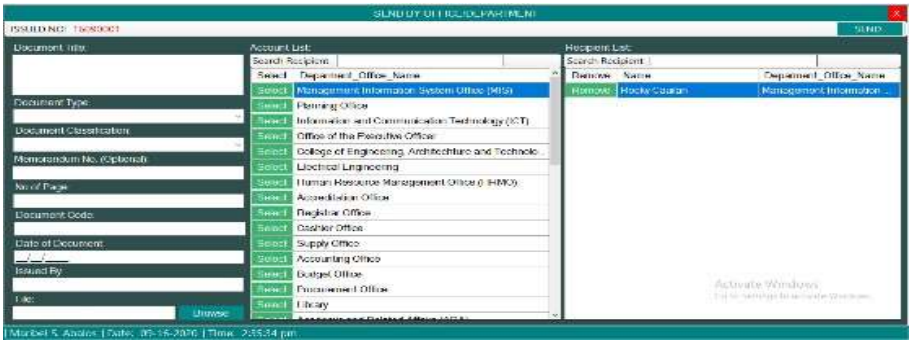

Figure 4. Sending Documents to offices

Figure 4 shows that the system can easily distribute documents. The system may send individual or multiple offices it depends on the number of offices whom to address the documents.

Figure 5 Document Monitoring Panel

Figure 5 shows that the recording officer may monitor the recipients of send documents. It displays the Issued no., type of document, and name of the recipient.

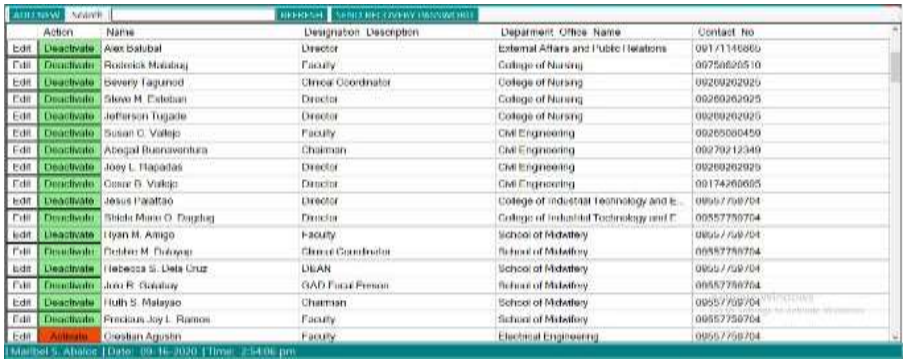

Figure 6. Notifications Number

Figure 6 shows that the system can easily send data because each employee has registered each mobile number. So, upon sending documents the recipients received a message or notification in their respective mobile number.

Figure 7. Notifications Panel

Base on figure 7 if the recipient of documents send has no mobile phone still the recipient may receive notifications. The recipient may still notify through in the notification panel of the system. It displays the name of the recipient and what kind of document send either memorandum or communication letter.

Figure 8. Received Documents

Figure 8 shows that the system accepts documents sent by the records office. The document sent can be saved, downloaded, or can be print immediately. So, upon viewing or seen by the recipients, the recording officer can monitor the sent documents to the recipient/s.

Figure 9 Distribution List

The figure shows the list of the documents sends to the recipients. The system is easily retrieving the sent documents on the past days, months, &, etc... It depends on the document that needs to retrieve. To retrieve the data simply search the document name then it will automatically display the document.

Testing of the SMS-Based Inter-Campus Communication System

During the testing, the researcher used system testing and unit testing. The system testing is used to check if the system works properly on their respective computer unit. It's included to test the operational capability and the functionalities of the system.

Group	Frequency	Percentage
ISU Employee	10	66.67%
IT Experts	5	33.37
Total	**15**	**100.00**

Also, unit testing is used in the system, wherein each module of the system was tested from User Log-in, accessing the different menus under the process of the system up to the generating of reports.

Based on the results and findings during the testing, the recording officer observed that the system works properly in the offices. It is quick in sending documents to the different offices and concerned recipients through LAN-based, there is no longer difficulty in sending. Also, the users quickly noticed that there was a document sent to their respective accounts through receiving a text from their mobile phone.

Evaluation of the SMS-Based Inter-Campus Communication System

Respondent of the Study

The respondent of this study is the group of ISU Employee. They are the ones who are knowledgeable enough to answer the problem posed in the present study.

Table 3. Evaluation of the respondents on the SMS-Based Inter-Campus Communication System in terms of Functionality.

Functionality	5	4
1. The developed system can cover all the specified tasks and user objectives.	4.93	Strongly Agree
2. The developed system can provide the correct results with the needed degree of precision.	4.87	Strongly Agree
3. The developed system can facilitate the accomplishment of specified tasks and objectives.	4.87	Strongly Agree
Category Mean	4.89	Strongly Agree

The table reveals that the system has met the required functionality in terms of specified task and user objectives with a mean of 4.93 which is interpreted as Strongly Agree. The system can send memorandum or any communication letter through using LAN and it reached the intended recipients. The system may prove when the communication was sent because it indicates the date send of the communication. The recipients also may receive notifications through SMS.

Table 4. Evaluation of the respondents on the SMS-Based Inter-Campus Communication System in terms of Security.

Security	5	4
1. The developed system ensures that data are accessible only to those who have access.	4.67	Strongly Agree
2. The developed system can trace uniquely access actions of an entry.	4.67	Strongly Agree
3. The developed system can prevent unauthorized access to, or modification of computer programs or data.	4.6	Strongly Agree
Category Mean	4.65	Strongly Agree

The table illustrates that the developed system ensures that the data are accessible only for those who have access with the mean of 4.67 which is interpreted as Strongly Agree. Documents are well protected from being accessed by unauthorized parties. only the people who are authorized to do so can gain access to the sensitive data.

Table 5. Evaluation of the respondents on the SMS-Based Inter-Campus Communication System in terms of Portability.

Portability	5	4
1. The developed system can be effectively and efficiently adapted for different/existing hardware, software, or other operational environments.	4.8	Strongly Agree
2. The developed system can be successfully installed/uninstalled in a specified environment.	4.87	Strongly Agree
3. The developed system can replace another specified software product for the same purpose in the same environment.	4.67	Strongly Agree
Category Mean	4.78	Strongly Agree

As gleaned in Table 5, the respondents strongly agree that the system is easy to installed/uninstalled with a mean of 4.87 which is interpreted as Strongly Agree. Any windows operating system version can capable to operate the system.

5. CONCLUSION AND RECOMMENDATIONS

Based on the findings and analysis of the **SMS-Based Inter-Campus Communication System of Isabela State University – Ilagan Campus,** it is concluded that using manual system, problems are encountered in distributing and retrieving records, and preparing of reports. We, therefore, conclude that the proposed system must be adopted by the organization to make operations easier and faster. It was seen to lessen the task of the personnel who is in-charge of the transaction. It is also concluded that the system would benefit of organization most especially in organizing their records and reports

REFERENCES

1) Zhang, Y., Wang, L., & Duan, Y. Agricultural information dissemination using ICTs: A review and analysis of information dissemination models in China. *Information Processing in Agriculture*, *3*(1), 17–29. https://doi.org/10.1016/j.inpa.2015.11.002, (2016).
2) Zhang, N., Huang, H., Su, B., Zhao, J., & Zhang, B. Information dissemination analysis of different media towards the application for disaster pre-warning. *PLoS ONE*, *9*(5). https://doi.org/10.1371/journal.pone.0098649, (2014).
3) Kruchinin, S. V., & Bagrova, E. V. Systems of Electronic Document Management in Russian Education. Pros and Cons. Proceedings of the 2019 IEEE International Conference Quality Management, Transport and Information Security, Information Technologies IT and QM and IS 2019, 628–630. https://doi.org/10.1109/ITQMIS.2019.8928315(2019).
4) Ismail, S., & Husen, M. N. Improving information dissemination and collective data directory for focus group via the web-based system and SMS. *Proceedings of the 7th International Conference on Ubiquitous Information Management and Communication, ICUIMC 2013*, 1–5. https://doi.org/10.1145/2448556.2448569, (2013).
5) Zhen, L., & Deng, H. The design and implementation of a management information system for Dentsu technology company. Proceedings - 2011 4th International Conference on Information Management, Innovation Management and Industrial Engineering, ICIII 2011, 1, 239–242. https://doi.org/10.1109/ICIII.2011.62, (2011).
6) Shen, J. Q., Wang, H. Y., Meng, Z. J., & Huo, P. Management information system design of safe coal-production based on C/S and B/S. *TIME 2010 - 2010 2nd IEEE International Conference on Information Management and Engineering*, *6*, 305–308. https://doi.org/10.1109/ICIME.2010.5478032, (2010).

7) Amir, ,Document Management System, (2007)
8) Ugale M. K., et al.,Paperless Document Management System, (2017) 9. Volarevic et al., Document Management System". Retrieved from https://www.researchgate.net/publication/315798430_Electronic_Document_Management_System_for_Kirikkale_University, (2000)
9) Mustafa Başıbüyük1* and Atilla Ergüzen, Unified Journal of Computer Science Research Vol 1(2) pp. 008-015 December, 2015.
10) Yao, Y. H., Trappey, A. J., & Ho, P. S. XML-based ISO9000 electronic document management system. Robotics and Computer-Integrated Manufacturing, 19(4), 355-370, (2003).
11) Kao and Liu, Document Management System". Retrieved from https://www.researchgate.net/publication/315798430_Electronic_Document_Management_System_for_Kirikkale_University page 9., (2013)
12) Ermis, Document Management System". Retrieved from https://www.researchgate.net/publication/315798430_Electronic_Document_Management_System_for_Kirikkale_University page 9., (2006)
13) Hüseyin, Document Management System". Retrieved from https://www.researchgate.net/publication/315798430_Electronic_Document_Management_System_for_Kirikkale_University page 9, (2009),
14) Sunitha G., Jaya A. A Knowledge Based Approach for Automatic Database Normalization ISSN: 2278 –1323 International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), 2013.
15) Coetzer, Xolile Patience, The status of records management at the University of Zululand, University of Zululand, https://hdl.handle.net/10530/1219,(2012)
16) Mirek Truszczynski The Logic Programming Paradigm: A 25-Year Perspective. Springer Publishing Company, Incorporated (2011).
17) M. Dela Pena-Bandalaria, M. E-Learning in the Philippines: Trends, Directions, and Challenges. International Journal on E-Learning, 8(4), 495-510. Waynesville, NC USA:
18) Association for the Advancement of Computing in Education (AACE). Retrieved January 30, 2024 from https://www.learntechlib.org/primary/p/30504/.(2009).
19) McLeod, C. A. Class discussions: Locating social class in novels for children and young adults. Journal of Language and Literacy Education [Online], 4(2), 73-79. Available: http://www.coe.uga.edu/jolle/2008_2/class.pdf, (2008).
20) Pope, J. and Abdul-Jabbar, H. Tax Compliance Costs of Small and Medium Enterprises in Malaysia Policy implications. - References - Scientific Research Publishing. (n.d.). https://www.scirp.org/reference/ReferencesPapers?ReferenceID=2013152, (2008)
21) Karin L., & Heinz W. Development of word reading fluency and spelling in a consistent orthography: An 8-year follow-up. Journal of Educational Psychology, 100(1), 150–161. https://doi.org/10.1037/0022-0663.100.1.150, (2008).
22) Riabov, A. V., Bouillet, E., Feblowitz, M. D., Liu, Z., & Ranganathan, A. (2008). Wishful search: interactive composition of data mashups. Proceeding of the 17th International Conference on World Wide Web 2008, WWW'08, 775–784. https://doi.org/10.1145/1367497.1367602
23) Ommani, Ahmad. Regression Analysis of Innovation Management in Processing and Complementary Industries of Livestock Products. International Journal of Agricultural Management and Development (IJAMAD). 4. 179-185. 10.5455/ijamd.200107. (2015).
24) Sutton, S. A. The Dublin Core Metadata for Educational Resources. (PDF) 2001-SuttonMason. (n.d.). ResearchGate. https://www.researchgate.net/publication/260981145_2001Sutton-Mason, (2001).