Pak. j. life soc. Sci. (2024), 22(2):13715-13725 E-ISSN: 2221-7630;P-ISSN: 1727-4915

Pakistan Journal of Life and Social Sciences
www.pjlss.edu.pk

https://doi.org/10.57239/PJLSS-2024-22.2.00984

RESEARCH ARTICLE

Implementing A Web-Based Document Management System to Optimize Operational Efficiency in Engineering

Cesar Augusto Vega-Quintana[1*], Jhonar Angel Gallardo-Andrés[2], Carlos Enrique Chinga-Ramos[3].

[1,2,3] Universidad Nacional José Faustino Sánchez Carrión (UNJFSC), Huacho. Perú.

ARTICLE INFO

Received: Oct 2, 2024

Accepted: Nov 12, 2024

Keywords

Web-based document management

Operational efficiency

Document accessibility

Digital transformation

Workflow optimization

***Corresponding Author:**

cesarvq7@gmail.com

ABSTRACT

This study evaluates the implementation of a web-based document management system aimed at enhancing document accessibility, registration efficiency, and file management within the engineering department at Interoc S.A., a leading agricultural research and development company in Latin America. In engineering environments where timely access to accurate technical documentation is critical, traditional document storage and distribution methods often result in inefficiencies and delays. Using a quantitative, explanatory experimental design with a pretest-posttest model, this research examines the effects of a centralized digital system on key document management processes, including user registration, file uploading, and file consultation. Findings reveal a significant improvement in all targeted areas, with employee access to documentation rising from 27.8% pre-implementation to 77.8% post-implementation, confirming the system's effectiveness in optimizing workflow efficiency. These results align with both national and international studies that highlight the role of secure, user-friendly web-based systems in improving operational effectiveness. This study contributes insights relevant to digital transformation in engineering and offers a model for similar organizations aiming to enhance document control, accessibility, and user satisfaction.

INTRODUCTION

Effective document management is a foundational component of operational efficiency within engineering organizations, where timely access to technical documentation is critical. Dispersed storage and the use of multiple distribution channels for essential documentation often lead to inefficiencies that increase costs and slow workflows, particularly when information retrieval is delayed. In response to these challenges, many companies have adopted centralized, web-based document management solutions to streamline access, control, and retrieval processes. Such systems are increasingly relevant in sectors where operational demands are high, and accurate, real-time information is vital for decision-making.

Interoc S.A., an agricultural research and development company headquartered in Lima with a broad presence across Latin America, faces significant document management challenges within its engineering department. The company's engineering processes rely heavily on documentation, such as technical manuals, procedural guidelines, flow diagrams, and various organizational policies.

Currently, this documentation is stored in multiple locations and is often distributed through email, resulting in redundancy, delayed retrieval, and inefficient use of resources. The current state of document management in the company's engineering department highlights the need for a system that enables centralized storage, organization, and accessibility according to user roles and needs.

The implementation of a centralized document management solution aligns with Interoc S.A.'s strategic objectives of increasing internal efficiency, reducing operational costs, and enhancing the overall productivity of the engineering department. By enabling real-time access to organized information, the company can better respond to the demands of its clients and maintain a competitive edge in a rapidly evolving industry. Furthermore, this study contributes to the broader discourse on digital transformation in engineering, providing valuable insights into how similar organizations across Latin America might tackle document management challenges.

In light of these issues, this study seeks to answer the following research question: To what extent can a web-based document management system enhance document management processes within the engineering department at Interoc S.A.? The primary objective is to develop and evaluate a web-based system that improves user registration, file uploading and updating, and document retrieval, thereby optimizing the document management processes and enhancing overall operational efficiency in the engineering department.

Ii. Theoretical Framework

2.1 Background of the Study

International research highlights the growing reliance on secure and efficient web-based systems to enhance data management and streamline processes across industries. Candia (2021) examined the security of LAMP-based web applications on Ubuntu, concluding that this platform offers robust protections for information systems. Julian (2018) focused on call center management, showing that web applications can centralize data and improve operational oversight through systematic call tracking and analysis. Further, Stid (2021) demonstrated that visual data representation enhances user responsiveness, affirming that graphical interfaces can significantly improve data comprehension. Studies by Rodriguez and Camilo (2018) and Isauro (2020) underscore the value of integrating security plugins and adhering to OWASP standards to mitigate vulnerabilities in web applications, particularly those managing sensitive information like banking tokens, which proves essential for risk-prone environments.

These international studies collectively establish that web-based systems play a vital role in improving data access, security, and user engagement across various applications. They highlight that successful systems require secure frameworks, intuitive data visualization, and vulnerability assessments to ensure reliability and compliance, particularly in sectors handling sensitive data. This international perspective sets a foundation for exploring the impact of similar web-based systems in Latin American enterprises focused on engineering and technical documentation.

In Peru, studies reflect a comparable emphasis on web-based systems for operational improvement in diverse fields. Alami and Cerda (2019) implemented corrective measures for a maritime company's web application, resulting in enhanced security protocols. Orbegoso (2021) demonstrated the effectiveness of a risk and vulnerability model for the Social Capital Group, showcasing the model's ability to optimize web system security. Likewise, Cáceres (2019) created a web system for the retail sector to streamline department communication, which led to reduced costs and better information consistency. Arenas (2021) provided an essential application for public health by managing COVID-19 vaccine distribution efficiently through a web platform, while Vélez (2019) optimized Movistar's plan configuration, expediting the launch of mobile plans for the consumer market.

These national studies reinforce the advantages of implementing tailored web-based systems to address specific organizational challenges, such as cost reduction, process efficiency, and data security. The research suggests that well-designed web applications can significantly impact operational dynamics by enabling real-time access and optimized information flow, thereby enhancing organizational agility and responsiveness.

2.2 Theoretical Bases

2.2.1 Web-Based Systems

Web-based systems are technological platforms designed to manage and streamline organizational data through centralized, accessible interfaces. According to Jonnel (2018), a web-based system is a structured platform built upon a database that systematically organizes and retrieves information, facilitating real-time decision-making and operational efficiency. These systems are integral to document management in industries where timely access to accurate data is essential. By organizing documents into structured repositories, web-based systems improve workflows and enhance information control, ultimately supporting faster and more informed decision-making across various sectors.

2.2.2 Information Security in Web-Based Systems

Security in web-based systems is fundamental, particularly in applications that handle sensitive or mission-critical information. Security frameworks, such as OWASP (Open Web Application Security Project) standards, guide organizations in identifying and mitigating potential vulnerabilities that can expose systems to unauthorized access or data breaches (Isauro, 2020). Information security in web-based systems encompasses encryption protocols, secure user authentication, and regular vulnerability assessments to ensure data integrity and privacy. For organizations, maintaining robust security practices not only protects data but also fosters trust among users, making security a cornerstone of web-based system effectiveness.

2.2.3 User Interface and Experience (UI/UX) Design

The design of the user interface (UI) and user experience (UX) is pivotal in ensuring the accessibility and usability of web-based systems, directly influencing user satisfaction and system adoption rates. An intuitive UI/UX design minimizes the learning curve, allowing users to quickly locate and utilize functions such as document retrieval, upload, and data entry. Stid (2021) highlights that graphical and interactive design elements enhance user engagement by presenting data in a visually accessible manner, improving response times and reducing the cognitive load required for complex tasks. Therefore, UI/UX design is a critical factor in the successful implementation of web-based systems, particularly those intended for non-technical users.

2.2.4 Database Management and Cloud Integration

Modern web-based systems rely on structured databases and, increasingly, on cloud integration to support scalability, data synchronization, and real-time access across multiple departments and devices. Database management enables the structured storage of vast amounts of information, while cloud integration facilitates continuous access and collaboration, even in geographically distributed organizations (Cáceres, 2019). Cloud-based systems not only improve accessibility but also provide enhanced security and backup options, ensuring data continuity and resilience. By leveraging cloud and database technologies, web-based systems enable organizations to achieve greater operational flexibility, reduce physical storage requirements, and optimize resource use.

To encapsulate the theoretical framework, web-based systems emerge as transformative tools in organizational settings, enabling efficient document management, enhanced security, intuitive user experiences, and scalable data handling. By centralizing information access and providing real-time, secure retrieval options, these systems support streamlined workflows and bolster decision-making processes across departments. Security protocols, robust UI/UX design, and cloud-integrated databases further enhance the functionality and accessibility of these platforms, making them essential for organizations aiming to optimize resources and adapt to the fast-evolving digital landscape. The studies reviewed underscore that when properly designed and implemented, web-based systems significantly improve operational efficiency, information security, and user satisfaction, laying a strong foundation for their continued adoption in industries that depend on precise and reliable data management.

III. METHODOLOGY

This chapter outlines the methodological approach for evaluating the impact of a web-based document management system on the engineering department at Interoc S.A. The study adopts a quantitative, explanatory experimental design, employing a pretest-posttest model to assess how the new system influences document management processes.

3.1 Methodological Design

The research employs a quantitative, explanatory experimental design to explore the impact of implementing a web-based system on document management. The pretest-posttest model allows for measurement of changes in document management practices before and after the system's introduction, focusing on key functionalities like user registration, file uploading, and document consultation.

The design includes:

Pretest (O1): Baseline data on document management is collected through a structured questionnaire before introducing the web system.

Intervention (X): Deployment of the web-based document management system.

Posttest (O2): The same structured questionnaire is administered after the system's implementation to assess any improvements.

This pretest-posttest model controls for external variables by focusing on the same group before and after the intervention. This approach ensures that observed changes are attributable to the web system rather than other external factors.

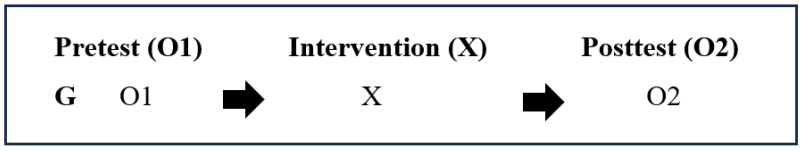

Figure 1: ***Research design***

Experimental Group (GE): The study employs a single-group design, where the same group of employees serves as both the pretest and posttest subjects. This controlled approach allows for accurate measurement of the web system's impact on the group's document management efficiency.

3.2 Population and Sample

3.2.1 Population

The study population consists of 18 employees from Interoc S.A.'s engineering department, all of whom are directly involved in document management processes. This group is chosen as it represents the target users of the web system, ensuring that the findings are directly applicable to the department's specific needs.

3.2.2 Sampling Method

Since the entire population will be included in the study, this research is classified as census-based. According to Hernández, Fernández, and Baptista (2014), a census approach includes all cases that meet specific criteria, which, in this case, are the employees involved in document management. By studying the entire population, the research gains comprehensive insight into the system's effect on all relevant users, enhancing the generalizability of the findings within the department.

3.3 Data Collection Techniques

Data for this study will be collected through a structured questionnaire designed to assess the impact of the web-based document management system on key areas of functionality within the engineering department. The questionnaire is organized around four main dimensions, each with specific indicators that provide a comprehensive evaluation of the system's effectiveness.

The first dimension, User Registration, measures the system's capability to effectively register employees, capturing essential information that ensures secure access to the system. Indicators for

this dimension include employee Name, DNI, Position, Start Date, Profile, and Email, all of which are crucial for tracking and managing user data.

The second dimension, File Consultation, evaluates the system's ability to facilitate file searches and retrievals. This aspect focuses on the speed and accuracy of document access, which are critical for efficient workflow in the engineering department. Key indicators for file consultation are Description and Type of files, which enable organized and intuitive file retrieval.

The third dimension, File Uploading, assesses the ease and efficiency with which documents can be uploaded into the system. This includes evaluating the system's handling of various file types, which ensures flexibility and compatibility with different document formats. Indicators for this dimension are Upload Time, File Size, and File Extension, which reflect the system's capacity to handle different types of files effectively.

The fourth and final dimension, Document Administration, analyzes the system's ability to manage various types of documents that are essential to the engineering department's operations. Indicators here include Procedures, Instruction Manuals, User Guides, Policies, and Flow Diagrams, which are fundamental for maintaining organizational consistency and supporting engineering workflows.

Each dimension, along with its corresponding indicators, has been carefully chosen to ensure that the questionnaire provides a comprehensive assessment of the web system's impact on document management. The questionnaire includes a combination of closed-ended questions, which capture quantitative data, and rating scales to obtain detailed feedback on each functionality.

To ensure that the questionnaire effectively measures the intended variables, it will undergo a pilot test with a small subset of users. This validation process will help identify any ambiguous items, refine questions for clarity, and confirm that the questionnaire aligns with the study's objectives.

3.4 Data Processing Techniques

Collected data will be processed using SPSS Version 25, allowing for detailed statistical analysis that includes:

Descriptive Statistics: Initial summary statistics (e.g., mean, median) for each variable, offering a baseline and post-intervention overview of document management practices.

Paired Sample T-Test: To compare pretest (O1) and posttest (O2) scores, assessing whether the observed changes in document management are statistically significant.

Hypothesis Testing: Verification of each hypothesis related to the impact of the web system on user registration, file uploading, file consultation, and document administration.

The data analysis will result in:

Distribution Tables: Summarize responses for each variable.

Graphs and Charts: Visual representations to illustrate changes in each dimension.

Hypothesis Test Results: Evaluate the statistical significance of improvements in document management.

3.5 Limitations and Control Measures

While this study provides valuable insights, certain limitations must be acknowledged:

Single-Group Design: Without a control group, external factors influencing document management cannot be fully ruled out.

Small Sample Size: With only 18 participants, findings may be specific to Interoc S.A. and not generalizable to larger populations.

To mitigate these limitations, the study ensures that:

All participants receive standardized training on using the web system to minimize variability due to unfamiliarity.

Pretest and posttest are conducted under similar conditions to control for external influences.

3.6 Ethical Considerations

The study adheres to ethical standards by ensuring that:

Informed Consent: All participants are informed about the study's purpose and consent to participate.

Data Privacy: Participant responses and personal information are confidential and used solely for research purposes.

Voluntary Participation: Participation is voluntary, with participants free to withdraw at any time.

This methodology chapter presents a structured approach to assessing the impact of a web-based document management system on the engineering department at Interoc S.A. By combining a pretest-posttest design, census-based population selection, and rigorous data analysis techniques, the study aims to generate valid and reliable findings. This methodological framework provides a solid basis for evaluating the system's effectiveness in enhancing document management practices, contributing to organizational efficiency and data accessibility.

IV. RESULTS

4.1 Descriptive results

This section presents the findings of the study, focusing on the ability of employees in the engineering department at Interoc S.A. to consult files within the newly implemented web-based document management system. The results are derived from questionnaire responses before (pretest) and after (posttest) the implementation of the web platform, aimed at assessing improvements in document accessibility.

Pretest Results

To establish a baseline, participants were asked, *"Are you currently able to consult files from the engineering department of Interoc S.A. through the web system?"* The pretest results are summarized in **Table 6** and **Figure 5**.

Table 6 shows that:

5 employees responded "Yes," indicating that they could consult files, which represents **27.8%** of the total respondents.

13 employees responded "No," indicating they could not consult files, representing **72.2%** of the respondents.

These results suggest that prior to the web system's implementation, the majority of employees (72.2%) were unable to access files through the system, highlighting a significant limitation in document accessibility.

Table 1: ***Pretest Results on File Consultation Ability***

Response	Frequency (fi)	Relative Frequency (hi%)	Cumulative Frequency (Fi)	Cumulative Relative Frequency (Hi%)
Yes	5	27.8	5	27.8
No	13	72.2	18	100.0
Total	18	100.0	18	100.0

Table 1 shows that 5 employees (27.8%) responded "Yes," indicating they could consult files, while 13 employees (72.2%) responded "No." These results suggest that prior to the system's implementation, the majority of employees (72.2%) were unable to access files through the system, highlighting a significant limitation in document accessibility.

Posttest Results

Following the implementation of the web-based document management platform, the same question was posed to participants to assess the system's effectiveness. The posttest results are presented in **Table 2** and **Figure 2**.

Table 2: Posttest Results on File Consultation Ability

Response	Frequency (fi)	Relative Frequency (hi%)	Cumulative Frequency (Fi)	Cumulative Relative Frequency (Hi%)
Yes	14	77.8	14	77.8
No	4	22.2	18	100.0
Total	18	100.0	18	100.0

Table 2 reveals that 14 employees (77.8%) could now consult files through the system, while 4 employees (22.2%) could not. These findings reflect a substantial improvement in file accessibility, with the majority (77.8%) of employees able to consult post-implementation files, compared to only 27.8% in the pretest.

The pretest and posttest results highlight a clear shift in accessibility to engineering department files. The proportion of employees who could access files rose from **27.8%** in the pretest to **77.8%** in the posttest. This improvement of **50 percentage points** confirms that the newly implemented web-based document management system has enhanced document consultation for the engineering department, addressing a key operational need identified at the study's outset. These findings support the effectiveness of the web system in achieving its intended goal of facilitating document access and improving workflow efficiency.

4.2 General Hypothesis Testing

To assess the impact of the web-based system on user registration, we tested **Hypothesis 1**: *The system improves user registration in the engineering department at Interoc S.A.*

H_0: The system does not improve user registration.

H_1: The system improves user registration.

With a **p-value of 0.003** ($\alpha = 0.05$), we reject the null hypothesis (H_0) and accept the alternative (H_1), confirming that the system significantly enhances user registration processes.

Table 3. Hypothesis Test Summary

Hypothesis Summary	
Null Hypothesis	The distributions of the different values between Register Information and Register Information - Web System have the same probabilities.
Test	McNemar Test for Paired Samples
Sig.	.003[1]
Decision	Reject the null hypothesis

Note. Asymptotic significances are shown. The significance level is .05.

The McNemar test for paired samples yielded a significance value (Sig.) of .003, which is below the significance level of .05. This result leads to the rejection of the null hypothesis, indicating that the implementation of the web system significantly impacted the distribution of values for "Register Information," thus confirming an improvement in the user registration process.

4.3 Specific Hypothesis Testing Summary

Two specific hypotheses were tested to evaluate the impact of the web-based system on document management processes within the engineering department at Interoc S.A.

Table 4. Summary of Specific Hypothesis Tests

Hypothesis	Null Hypothesis (H_0)	Alternative Hypothesis (H_1)	p-value	Decision

Hypothesis 2: File Upload	The system does not improve file uploading.	The system improves file uploading.	0.004	Reject H_0
Hypothesis 3: File Consultation	The system does not improve file consultation.	The system improves file consultation.	0.035	Reject H_0

Specific Hypothesis 2 assessed whether the web system improves the **file upload** process. The null hypothesis (H_0) stated that the system does not improve file uploading, while the alternative hypothesis (H_1) proposed that it does. The parametric test yielded a p-value of 0.004, which is below the significance level ($\alpha = 0.05$). Therefore, we reject the null hypothesis and accept the alternative, concluding that the web system significantly improves the file upload process.

Specific Hypothesis 3 evaluated whether the web system enhances **file consultation**. The null hypothesis (H_0) suggested no improvement in file consultation, while the alternative hypothesis (H_1) proposed a positive effect. With a p-value of 0.035 ($\alpha = 0.05$), the null hypothesis is rejected, supporting that the web system significantly enhances file consultation capabilities.

These results confirm that the web-based system effectively improves both file uploading and file consultation processes.

V. DISCUSSION

This chapter discusses the findings of this study in the context of the theoretical framework and relevant background studies. The primary aim was to assess the effectiveness of a newly implemented web-based document management system in improving user registration, file uploading, and file consultation processes within the engineering department at Interoc S.A.

Improvement in User Registration

The first hypothesis aimed to determine whether the web-based system would improve user registration processes. The pretest-posttest comparison showed a significant improvement, with a p-value of 0.003 ($\alpha = 0.05$), confirming the positive impact of the system. This finding aligns with the theoretical principles outlined by Jonnel (2018), who defines web systems as essential tools for systematically managing information and facilitating access. By organizing user data (Name, DNI, Position, etc.) in a structured format, the system supports efficient onboarding, which was one of the intended outcomes of this implementation.

This result also resonates with the findings of Alami and Cerda (2019), who demonstrated that web systems could successfully streamline and improve information access and security protocols in a maritime setting. Similarly, the present study validates the effectiveness of centralized, web-based systems for organizing user data, highlighting their broad applicability across industries.

Enhancement in File Uploading Process

The second hypothesis assessed whether the web-based system would improve the efficiency of the file uploading process. With a p-value of 0.004 ($\alpha = 0.05$), the hypothesis was supported, showing significant improvement in how files were uploaded. The system's capacity to manage various file types, upload times, and sizes aligns with the recommendations from Stid (2021), who found that users are more responsive to systems that provide organized, visual interfaces for file handling.

The improvement in file uploading is also consistent with the studies by Cáceres (2019), who demonstrated that web applications in retail businesses could streamline document management and reduce operational costs through efficient file handling. Furthermore, Julian (2018) found that a centralized database improves data organization, which directly supports the findings of this study, confirming that a well-designed web system optimizes file handling processes, enhances productivity, and minimizes redundancy.

Improvements in File Consultation

The third hypothesis tested whether the web-based system would enhance file consultation, and the results confirmed this hypothesis, with a p-value of 0.035 ($\alpha = 0.05$). After implementation, 77.8% of employees reported being able to consult files directly, compared to only 27.8% in the pretest. This

finding aligns with Candia's (2021) observation that secure, centralized systems on platforms like LAMP significantly improve information access and usability. Enhanced consultation capabilities are critical in high-demand environments like engineering, where timely access to technical documents directly impacts workflow and efficiency.

The results are also in agreement with the conclusions drawn by Arenas (2021) in public health contexts, where a web system for COVID-19 vaccine management enabled seamless data access and real-time updates. Similarly, Rodriguez and Camilo (2018) emphasized the importance of a secure and efficient consultation process within web systems to maintain accessibility and enhance security, supporting this study's conclusion that such systems are indispensable for real-time information access.

Broader Implications of Findings

These findings suggest that web-based document management systems are instrumental in improving organizational efficiency, particularly in complex, data-intensive environments like engineering. According to Market (2019), effective document management is crucial for maintaining control over business processes, as it enables organizations to store, retrieve, and consult data efficiently, a principle well-illustrated by this study's outcomes.

The improvements observed in user registration, file uploading, and file consultation further validate the theoretical foundations and empirical research outlined in the background studies. The web system implemented at Interoc S.A. demonstrates that secure, centralized platforms can significantly enhance operational efficiency by providing structured access to information and reducing manual processing times. This aligns with the work of Isauro (2020), who found that web systems adhering to OWASP standards protect data integrity while ensuring accessibility.

Limitations and Future Research

While the study provides valuable insights, it is important to note the limitations associated with a single-group pretest-posttest design, which may not fully control for external factors. Future research could employ a control group or explore similar implementations in different organizational contexts to enhance the generalizability of these findings. Additionally, further studies could examine user satisfaction in more detail, integrating qualitative feedback on system usability.

Conclusion

The findings confirm that the web-based document management system has significantly improved document management practices in the engineering department at Interoc S.A., aligning with theoretical principles and past research. This study demonstrates that centralized, secure web systems can effectively enhance user registration, streamline file uploading, and improve file consultation capabilities, supporting operational efficiency in data-driven environments.

VII. CONCLUSION

The implementation of a web-based document management system in the engineering department at Interoc S.A. has demonstrated clear improvements in document accessibility, user registration, and file handling processes. The study confirms that centralized systems significantly enhance organizational efficiency by providing structured and reliable access to essential information. These results align with the theoretical perspectives of Jonnel (2018) and Market (2019), who emphasize the importance of systematic information management for operational effectiveness. The increased ability of employees to access, upload, and retrieve files efficiently supports the overall goal of optimizing document management within a data-intensive environment.

Additionally, the study's findings resonate with previous research by Alami and Cerda (2019) and Arenas (2021), underscoring the broader applicability of web-based systems across industries. The notable improvement in file consultation and registration processes reflects the benefits of secure, centralized platforms, as highlighted in the literature. By reducing the time and effort required for document handling, the system has allowed the department to streamline workflows and improve response times, which are essential for maintaining productivity in engineering operations.

However, this study also acknowledges certain limitations, such as the absence of a control group and a relatively small sample size, which may affect the generalizability of the findings. Future

research could expand on this work by including a control group or examining similar implementations in other departments or companies. Despite these limitations, the study provides compelling evidence that a well-designed web-based document management system can serve as a valuable tool for improving efficiency, security, and accessibility in document-heavy organizational contexts.

ACKNOWLEDGMENTS

The authors would like to express their deepest gratitude to the management and staff of Interoc S.A. for their invaluable support and collaboration throughout this research project. Their insights and commitment to improving document management practices were essential in the successful implementation and assessment of the web-based system. Special thanks go to the engineering department team members for their active participation in the pretest and posttest phases, as well as for their patience and adaptability during the system transition.

REFERENCES

Alami, L. T., & Cerda, E. M. (2019). *Propuesta de medidas correctivas de un sistema web para la empresa marítima Cosmos Agencia Marítima S.A.C.* [Bachelor's thesis, Universidad Tecnológica del Perú]. Repositorio UTP. https://repositorio.utp.edu.pe/bitstream/handle/20.500.12867/3006/Danitza%20Llanos_Maykol%20Cerda_Trabajo%20de%20Investigacion_Bachiller_2019.pdf?sequence=4&isAllowed=y

Arenas, L. M. (2021). *Implementación de un sistema Web para la gestión de vacunas del Covid-19 en una entidad pública 2021* [Bachelor's thesis, Universidad Tecnológica del Perú]. Repositorio UTP. https://repositorio.utp.edu.pe/bitstream/handle/20.500.12867/5068/D.Mego_Trabajo_de_Suficiencia_Profesional_Titulo_Profesional_2021.pdf?sequence=1&isAllowed=y

Cáceres, L. R. (2019). *Sistema Web para empresas del rubro retail JosMari* [Bachelor's thesis, Universidad Tecnológica del Perú]. Repositorio UTP. https://repositorio.utp.edu.pe/bitstream/handle/20.500.12867/2536/Renzo%20Caceres_Trabajo%20de%20Investigacion_Bachiller_2019.pdf?sequence=1&isAllowed=y

Candia, T. P. (2021). *Evaluación de seguridad de aplicaciones web en LAMP sobre Ubuntu 18.4* [Bachelor's thesis, Universidad Católica de Colombia]. Repositorio UCatolica. https://repository.ucatolica.edu.co/server/api/core/bitstreams/f4d5ca01-d474-427f-8a22-d698ddde8321/content

Isauro, C. M. (2020). *Análisis detallado de vulnerabilidades en la aplicación web de administración de tokens bancarios de una entidad financiera en Colombia* [Bachelor's thesis, Universidad Católica de Colombia]. Repositorio UCatolica. https://repository.ucatolica.edu.co/server/api/core/bitstreams/0441007b-44c2-403f-9dd9-cf71b250b7e8/content

Jonnel, M. T. (2018). *Sistema web para el proceso de cobranzas en el área de operaciones de la empresa Lerma S.A.C.* [Bachelor's thesis, Universidad César Vallejo]. Repositorio UCV. https://repositorio.ucv.edu.pe/bitstream/handle/20.500.12692/18370/Mateo_TBJ.pdf?sequence=4&isAllowed=y

Julian, C. S. (2018). *Aplicación web para el análisis y monitoreo de llamadas entrantes en una empresa de contact center* [Bachelor's thesis, Universidad Católica de Colombia]. Repositorio UCatolica. https://repository.ucatolica.edu.co/server/api/core/bitstreams/cdb0831f-d1bf-4e39-9e20-62254afd1799/content

Market, T.-E. (2019). *Definición de administración de documentos*. TechLib. https://techlib.net/definition/application.html

Orbegoso, H. J. (2021). *Implementación de un modelo de análisis de vulnerabilidades y riesgos para los sistemas web de la empresa Social Capital Group* [Bachelor's thesis, Universidad Tecnológica del Perú]. Repositorio UTP. https://repositorio.utp.edu.pe/bitstream/handle/20.500.12867/4995/J.Orbegoso_Trabajo_de_Suficiencia_Profesional_Titulo_Profesional_2021.pdf?sequence=5&isAllowed=y

Rodriguez, R. R., & Camilo, E. R. (2018). *Integración de plugin a un navegador web para análisis de vulnerabilidades en JavaScript* [Bachelor's thesis, Universidad Católica de Colombia].

Repositorio UCatolica. https://repository.ucatolica.edu.co/server/api/core/bitstreams/66412ad0-90f0-4223-8f9f-a18ccc3024d9/content

Stid, S. Y. (2021). *Sistema web para edición de visualización descriptiva de datos* [Bachelor's thesis, Universidad Católica de Colombia]. Repositorio UCatolica. https://repository.ucatolica.edu.co/server/api/core/bitstreams/9a338c4f-6de1-459b-85a8-60f890b7f391/content

Vélez, N. A. (2019). *Sistema Web para la creación de planes móviles de la oferta residencial de Movistar* [Bachelor's thesis, Universidad Tecnológica del Perú]. Repositorio UTP. https://repositorio.utp.edu.pe/bitstream/handle/20.500.12867/3120/Nestor%20Reupo_Trabajo%20de%20Suficiencia%20Profesional_Titulo%20Profesional_2019.pdf?sequence=1&isAllowed=y