



SOFTWARE TOOL ARTICLE

REVISED Towards inventory control excellence: An innovative approach based on a web-based platform [version 2; peer review: 2 approved]

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Abstract

Background

Inventory management in educational institutions presents unique challenges due to the diverse sources of information and the need for improved team collaboration. This research aims to enhance inventory processes in educational institutions by leveraging information technology to optimize efficiency and ensure data integrity and reliability.

Methods

The study employed a five-phase methodology to develop a web-based inventory optimization system. The initial phase involved a comprehensive analysis of inventory requirements, considering multiple data sources and team needs. Subsequently, in the planning phase, requirements were prioritized, and tasks with corresponding deadlines were established.

The implementation phase adhered to the requirements outlined in the planning phase, utilizing appropriate information technologies to ensure efficient and reliable operation. A thorough system review was conducted to assess the achievement of each requirement's objectives, with necessary adjustments made as needed. Finally, following the completion of the previous phases, the developed software was deployed, and additional testing was conducted to ensure proper functionality.

Results

Open Peer Review

Approval Status

	1	2
version 2 (revision) 15 Dec 2023	 view	
	↑	
version 1 15 Nov 2023	? view	 view

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2. **Andy Reyes**, Open Nova Lima Perú, Lima, Peru

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Following the implementation of the web-based system, significant improvements were observed: an 85.51% increase in efficiency for goods searches, streamlining the process and reducing location times; a 90.31% enhancement in goods registration, ensuring greater accuracy and data reliability; an 83.11% improvement in annual goods report generation, simplifying reporting and offering a clearer view of the inventory. Overall, the inventory process experienced an 86.31% improvement, leading to enhanced efficiency and collaboration among administrative and teaching staff. The utilization of information technology reduced inventory processing times and ensured the uniqueness and reliability of information.

Conclusions

This research focuses specifically on optimizing inventory management in educational institutions through information technology. The study's uniqueness lies in its tailored web-based system designed to address the specific needs of educational institutions. The results demonstrate the effectiveness of this approach and its positive impact on inventory management.

Keywords

Inventory, system, web system, inventory control

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REVISED Amendments from Version 1

This new version provides more details on the specific information technologies used during implementation, as well as the evaluation criteria used during the review of the system. Information on Development Technologies, Strategic Plug-in Integration, Technological Details for Indexation Consideration and Evaluation Criteria during System Review has been added.

Any further responses from the reviewers can be found at the end of the article

Introduction

Over the past decade, there has been a significant surge in the popularity of web-based systems worldwide, primarily attributed to their intricate nature and ability to facilitate simultaneous user support (Mora, 2011). A notable example is the study by Qin *et al.* (2021), which implemented a system for reagent chemicals to facilitate searches and instantly know their location, allowing scientists to focus on developing new drugs. Research by Chila and Susi (2019) in the United States also highlighted the importance of information technology (IT) systems in inventory management, finding that supply management was time consuming in interventional radiology patient care. Using Lean principles, which refer to a set of practices and concepts designed to optimize efficiency and eliminate waste in business processes (Kumar *et al.*, 2022), evaluated and improved an outdated process and implemented an inventory control system that resulted in significant time and cost savings.

One of the most prominent types of systems are web systems or applications. According to Molina-Ríos and Pedreira-Souto (2020), these systems are similar to traditional software and require development processes that include requirements gathering and programming in different languages, which can lead to heterogeneity during their development. In addition, the widespread adoption of web systems, driven by their rapid growth and numerous advantages, has significantly impacted e-commerce (Castilla *et al.*, 2020). These systems facilitate direct interaction between end-users and the content of web pages. In addition, research in the UK has developed a machine learning-based computer system that can perform quality control by identifying defective parts and stopping the production process (Papananias *et al.*, 2020).

In the South American country of Peru, many public and private organizations have implemented software to automate their processes (Centrum-PUCP, 2023). This gives them a competitive advantage by allowing them to save resources in terms of money, time and personnel (Wilson & Mergel, 2022). In this regard, Figure 1 shows the sectors of companies that have invested the most in technology, highlighting the following “electricity (42.3%), private education (39.0%), information and communication (37.4%), professional, scientific and technical activities (32.0%), manufacturing (31.4%) and hydrocarbons (30.8%), among the most important” (Instituto Nacional de Estadística e Informática, 2019).

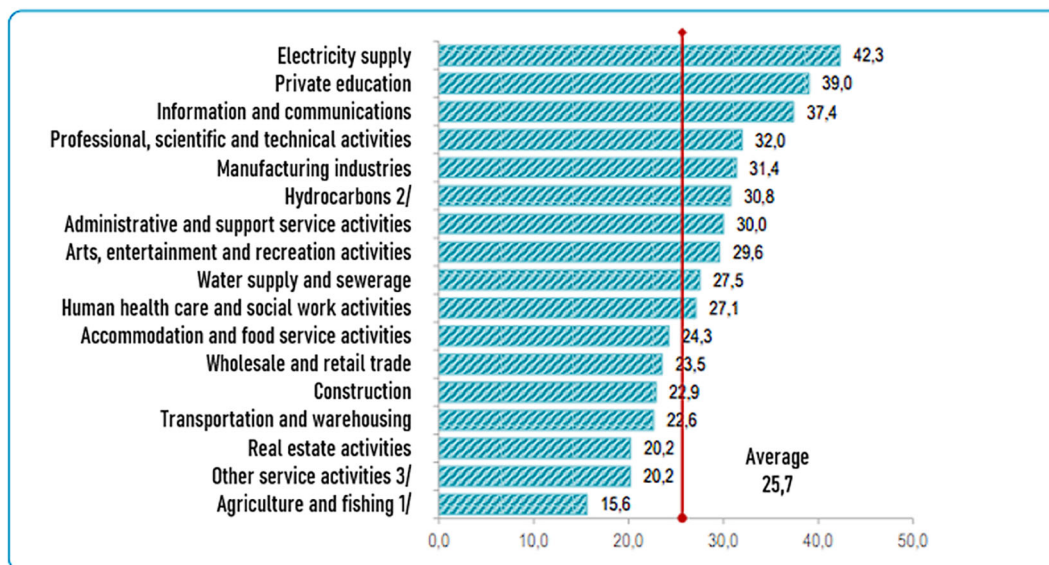


Figure 1. Companies that invest in science and technology, by economic activity. Note: Percentage of investment in science and technology by company according to economic activity. Source: (Instituto Nacional de Estadística e Informática, 2019) – Reproduced with permission under the terms of the Instituto Nacional de Estadística e Informática's open licensing policy.

In the public education sector, entities are responsible for accounting, controlling and reporting their goods in a responsible manner. These educational institutions are subordinated to the Local Education Management Unit (UGEL), as an example of decentralisation of local government, and depend on the Regional Directorate of Education (DRE) for administrative, normative and technical support (D. S. No 019-2019-VIVIENDA, 2019). Management follows the rules of the National Superintendence of State Goods (SBN), which standardises codes and processes for each public good. Failure or delay in sending this information may result in a call for attention, a memorandum or the withholding of economic resources.

In Ancash, Peru, a web-based inventory management system was implemented in UGEL Aija, resulting in a 43.15% improvement in the supply rate and a 36.3% increase in the inventory turnover rate (Sena, 2021). On the other hand, in Piura with Chiroque (2018), an inventory system was developed and the average times for registering goods, generating reports, searching for a good and ordering a good were improved. Similarly, Ramos (2016) implemented a system in the Telematics Office of the Police Front of Puno, Peru, using the agile methodology Extreme Programming (XP), which, thanks to its flexibility, allowed iterative acceleration and achieved functionalities such as improving the inventory work by 60% of the total.

Currently, according to information provided by officials at public educational institutions in San Vicente de Cañete, Lima, Peru, such as the José Buenaventura Sepúlveda Public Educational Institution, good information is recorded on physical documents and then transcribed into Excel spreadsheets. This has reportedly resulted in disorganized and duplicated records throughout the year, as well as the generation of reports with incorrect or outdated data. Therefore, the aim of this research is to implement web-based software that will improve the inventory control process and provide the institution with a technological advance to meet new educational challenges. In addition, it aims to provide accurate information about the goods, which will allow efficient management of the institution's resources and indirectly promote quality education for both students and society.

While it is true that there are several applications with similar purposes in other sectors (Pereira *et al.*, 2022), it is important to note that the application described in this article has been developed specifically for the education sector, taking into account the particular needs and requirements of an institution that lacks both technological tools and knowledge in the implementation of technology in educational processes. In addition, the application complies with the laws and regulations of the education sector regarding information management. (Chiroque, 2018). It is important to highlight that this tool is innovative in the educational context and represents an important solution to improve the inventory control process of educational institutions. In particular, the application demonstrates how technology can be used to improve public services and promote digital transformation (Castilla *et al.*, 2023). This may be relevant for other institutions that wish to implement digital solutions to improve information management (Ramos, 2016). It therefore represents an innovation in the local context and contributes to the advancement of the implementation of digital solutions in the education sector.

Methods

In this section, we provide a detailed account of the methods employed in the development and operation of our software tool tailored for educational institution inventory control.

Implementation

Development Technologies

Our software tool was meticulously developed using an amalgamation of state-of-the-art technologies. The backend is powered by Laravel 9, an open-source PHP framework renowned for its robust features, making the most of the capabilities offered by PHP 8.1. Simultaneously, the frontend is constructed on Vue3, an open-source JavaScript framework that ensures a dynamic and responsive user interface.

Strategic Plug-in Integration

To enhance the functionality of our software tool, we judiciously incorporated several essential plug-ins and libraries, including:

- “laravel-dompdf” for the generation of PDF reports.
- “laravel/sanctum” to reinforce Application Programming Interface (API) authentication.
- “maatwebsite/excel” for advanced Excel export capabilities.

Customization for Educational Institutions

The core framework of our software underwent customization to align with the distinctive requirements of educational institutions. This involved tailoring categorization, user roles, and reporting functionalities to specifically address the needs of educational inventory management.

Technological Details for Indexation Consideration

- **Backend Framework:** Our system relies on Laravel 9, an open-source PHP framework celebrated for its robust features and compatibility with PHP 8.1.
- **Frontend Framework:** The user interface is constructed using Vue3, an open-source JavaScript framework known for its dynamic and responsive design.
- **Plug-ins and Libraries:** Key plug-ins and libraries were strategically integrated to enhance functionality, including “laravel-dompdf” for PDF report generation, “laravel/sanctum” for fortified API authentication, and “maatwebsite/excel” for advanced Excel export capabilities.

Evaluation Criteria during System Review

- During the system review process, the following criteria were judiciously employed to assess the effectiveness and applicability of the developed system.
- **Functionality:** Evaluation of the system's features and capabilities, with a focus on seamless integration and operational efficiency.
- **Security:** Rigorous assessment of the API authentication using the “laravel/sanctum” plug-in to ensure robust security measures.
- **Reporting:** Examination of reporting functionalities tailored for educational institutions, assessing their alignment with specific inventory management needs.

By providing these additional details, we aim to enhance the understanding of the efficacy and applicability of our developed system, aligning with the suggestions for indexation consideration.

Operation

Minimal system requirements: Our web-based inventory control system operates smoothly with minimal system prerequisites. These include:

- **Server:**
 - A server environment compatible with Laravel 9.
 - PHP 8.1 support.
 - Adequate storage capacity for housing inventory data.
- **Client:**
 - A modern web browser with JavaScript enabled.
 - Internet connectivity for web-based access.

By adhering to these minimal system requirements, we ensure that our software tool remains accessible and functional, even in resource-constrained educational settings.

Unique features

This software tool boasts distinctive features that set it apart from existing solutions:

- Educational institution-centric: our software is purpose-built for educational institutions, accommodating their specific workflows and requirements for efficient inventory management.
- Tailored customization: users can seamlessly customize workflows, good categorization, and reporting features to suit their institution’s needs, making it a versatile solution.
- Enhanced functionality: intergration of essential plug-ins and libraries enhances the software’s capabilities, ensuring comprehensive inventory management.

By outlining these methods and unique features, we provide a clear blueprint for the development and implementation of our software tool within educational institutions, enhancing its replicability and utility.

Use cases

Preface: Data Initialization

The system data is loaded automatically following the installation steps detailed in the “Readme.md” file found in the repository (Ramos-Miller (b), 2023).

Use case 1: goods search

To demonstrate the software’s functionality, we present a specific use case involving the search for goods within the educational institution’s inventory. In this scenario, a user initiates a goods search by specifying criteria such as the item’s name, category, location, or status. Upon submission, the software retrieves and displays a list of matching goods based on the provided criteria. This practical example illustrates the software’s effectiveness in helping staff quickly locate specific goods within the institution’s inventory, as show in Figure 2.

Input: Search input query: “Computadora”

Output: List of coincidences:

- MODULO DE MELAMINA PARA COMPUTADORA
 - Description, Status, Inventory Area, etc ...

ID	CODE	DESCRIPTION	INVENTORY AREA	GOOD CATALOG
258	88946450	MODULO DE MELAMINA PARA COMPUTADORA	Pulido y Gamboa	MODULO DE MELAMINA PARA COMPUTADORA
346	49556622	COMPUTADORA DE MANO - WORKPAD	Nava SA	COMPUTADORA DE MANO - WORKPAD
517	82875081	MODULO DE METAL PARA MICROCOMPUTADORA	Luna e Hija	MODULO DE METAL PARA MICROCOMPUTADORA
644	26296161	SISTEMA DE VISUALIZACION 3D PARA CIRUGIA VITREORRETINIANA ASISTIDA POR COMPUTADORA	Altamirano-Carmona	SISTEMA DE VISUALIZACION 3D PARA CIRUGIA VITREOF
728	14512825	VIDEO CAMARA PARA COMPUTADORA	Valles, Zamudio y Bravo	VIDEO CAMARA PARA COMPUTADORA
1132	37369102	MODULO DE MELAMINA PARA COMPUTADORA	Godinez SA	MODULO DE MELAMINA PARA COMPUTADORA
1286	45298263	COMPUTADORA PERSONAL PORTATIL	Contreras y Villarreal	COMPUTADORA PERSONAL PORTATIL
1361	49555619	COMPUTADORA DE CAMPO PORTATIL	Rios y Duran	COMPUTADORA DE CAMPO PORTATIL
3836	27765380	COMPUTADORA PERSONAL PORTATIL	Gonzales e Hija	COMPUTADORA PERSONAL PORTATIL
4033	40750533	COMPUTADORA SERVIDOR - MAIN FRAME	Contreras y Villarreal	COMPUTADORA SERVIDOR - MAIN FRAME

Figure 2. Goods search.

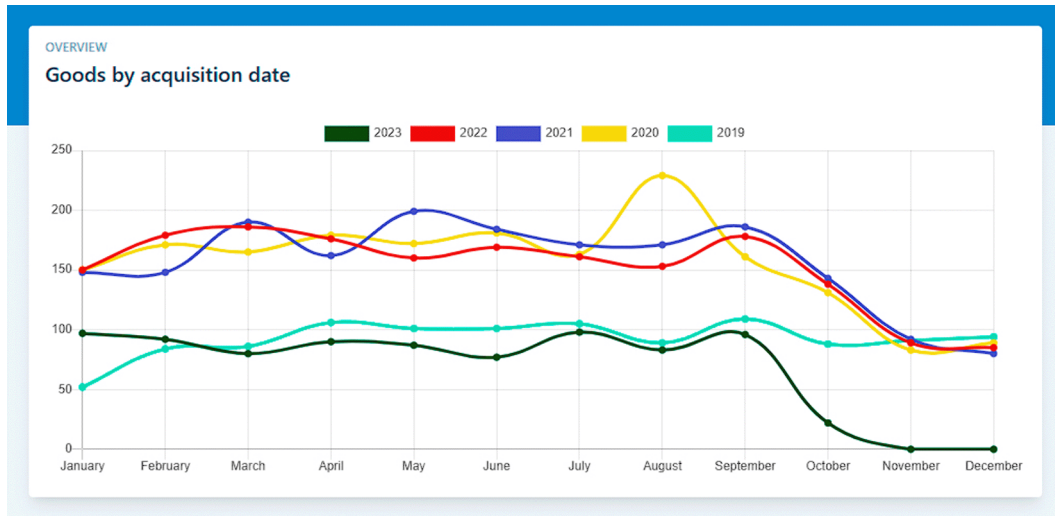


Figure 3. Statistical reports.

- COMPUTADORA DE MANO - WORKPAD
 - Description, Status, Inventory Area, etc ...
- MODULO DE METAL PARA MICROCOMPUTADORA
 - Description, Status, Inventory Area, etc ...

Use case 2: Statistical reports

In this scenario, we demonstrate how the software facilitates the generation of statistical reports related to goods. Users can select the type of report they require, such as inventory levels, asset depreciation, or goods distribution by category. The software processes the data and generates comprehensive statistical reports, which can aid in decision-making processes and provide insights into the institution’s goods management, as show in the [Figure 3](#).

Input: • Access the “Dashboard” view

Output: • Statistical Report “Goods by acquisition date”

Use case 3: Report generation according to SBN guidelines


In this scenario, we demonstrate the software’s capability to generate reports that strictly adhere to the guidelines established by the SBN. Users can access the Report menu, where they have the option to generate reports based on specific areas or encompassing all areas. The software will compile and format the necessary data to produce reports that precisely meet SBN standards. This functionality ensures that the institution can efficiently fulfill its reporting obligations to regulatory authorities, as shown in [Figure 4](#).

Input:

- Access the “Reports” view
- Select the “Inventory Area”
- Click in “Generate Report” button

Output:

- SBN Good Report (PDF)
- Report Date: Current date



REPORTE DE INVENTARIO - OCTUBRE 2023

AREA INVENTARIADO:
USUARIO RESPONSABLE:

Alarcón y Asoc.
Juan Manuel Javier Bermúdez Urrutia

BIENES PATRIMONIALES
FECHA DE INVENTARIO:

2023-10-12 09:43:36

N ORDEN	CODIGO PATRIMONIAL	CODIGO INVENTARIO	DESCRIPCIÓN DEL BIEN	MARCA	MODELO	TIPO	COLOR	SERIE	ESTADO CONSERV	FECHA ADQ.	VALOR	OBSERV.
1	67229595	42501230	TANQUE DE ALMACENAMIENTO DE LECHE PASTEURIZADA				fuchsia	#bc36ba	C	2019-12-02	304.9	MED
2	67500270	21894908	CALDERO				white	#3c2043	B	2021-06-30	384.3	MED
3	67225045	50420521	EQUIPO DETECTOR DE EXPLOSIVOS				silver	#a878c3	A	2022-09-30	316.9	MED
4	95227503	36590621	REPRODUCTOR GRABADOR DE DVD Y VHS - COMBO DVD/VHS				gray	#a40b40	C	2022-04-03	236.2	MED
5	74646950	34920636	SILLON MODULAR				green	#a6aa3c	A	2020-04-21	329.7	MED
6	60227121	67726949	PLANIMETRO				white	#466e47	B	2021-04-25	35.7	MED
7	67508156	38316722	PICADORA DE FORRAJE				purple	#e9f25	C	2022-06-04	307.2	MED
8	74645882	41262442	MESITA LATERAL DE MADERA				blue	#571b85	A	2023-08-29	370	MED
9	60220517	36690792	APARATO DE VICAT				yellow	#f67e8	B	2021-12-14	31.9	MED
10	74085225	48693429	KIOSCO MULTIMEDIA				black	#c766e	A	2021-05-04	460.3	MED
11	39229490	49209529	VIOLIN				white	#d853f0	C	2020-05-01	250.3	MED
12	39641150	48744772	ARTESANIA EN GENERAL (MAYOR A 1/4 UTI)				fuchsia	#d11e9	B	2022-06-21	253.3	MED
13	67227408	86319154	LINTERNA DE LARGO ALCANCE				gray	#a4397	A	2020-04-06	39.3	MED
14	53642430	11733126	CAMILLA DE MADERA				fuchsia	#8f08f6	A	2019-02-21	22.3	MED
15	95229742	72918581	UNIDAD MULTICANAL				black	#16d53e	A	2020-11-17	146.6	MED
16	74645339	88267620	MESA PLEGABLE DE METAL				white	#ba2258	B	2020-03-25	26.1	MED
17	32226326	89248154	LAVAVASOS MANUAL				teal	#5a456d	A	2021-11-27	194.5	MED
18	74645974	10119768	MESITA PARA COMPUTADORA PORTATIL				teal	#148631	A	2022-03-20	205.4	MED
19	74642627	37335131	CARPETA MULTIPLE DE MADERA				green	#cfc72b	C	2022-08-15	300.2	MED
20	39649950	35030329	SOPORTE PARA PENTAGRAMA				green	#2cb9cf	A	2023-07-23	400.2	MED
21	11221986	47482990	CONGELADOR PARA SANGRE				yellow	#1cb9fa	A	2021-11-27	298	MED
22	67220629	58168241	BOMBA DE MANO PARA RECARGA				black	#9c033e	A	2020-05-11	64.8	MED
23	53649855	79793550	TOCADOR DE MADERA				gray	#7a5062	B	2023-08-24	295.6	MED

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Figure 4. Report generation according to Superintendencia Nacional de Bienes Estatales (SBN) guidelines.

These use cases demonstrate how the software enhances goods management and reporting processes within an educational institution, offering valuable tools for inventory control and compliance with regulatory requirements.

Discussion

The implementation of the web-based system resulted in a substantial enhancement of the inventory control process, significantly optimizing goods and inventory management. As a result of our software implementation, staff had the opportunity to redirect their efforts toward other administrative or teaching tasks that could enhance the educational institution's overall performance. This is in line with (Chancasanampa-Mandujano *et al.*, 2019), where a warehouse management system was used to reduce the stock of raw materials, thus obtaining a more accurate inventory of inputs. In the same way (Ramos, 2016), reported improved telematics office operations with the implementation of the ISO 9126 standard, resulting in centralized and comprehensive information management. On the other hand, (Chila & Susi, 2019), highlighted that the management of supply inventory in radiology is one of the main causes of wasted time, with a potential negative impact on patient care in interventional radiology. Therefore, using Lean principles, we evaluated an outdated process and implemented an inventory control system with good results, saving time and money. In turn, these results agree with (Tejesh & Neeraja, 2018), where a warehouse inventory control system was developed based on IOT (Internet of Things) architecture, which was designed to track products using their corresponding tags and timestamps for further analysis and accurate verification. The developed warehouse inventory management system was efficient, as it was able to perform real-time search operations from the database and update information with the help of web servers.

The enhancement in goods search and localization further streamlined the identification and localization of educational institution goods. This is in agreement with (López & Pérez, 2016) who obtained an improvement in the search of technical files thanks to the implementation of the computer system, as well as an improvement in the process of patient care. Similarly (Chiroque, 2018), witnessed changes that greatly benefited institution staff, with goods search, filtering, and reporting processes improving. This work introduced an automated solution to goods management issues, ultimately leading to enhanced inventory management in the institution (Nemshaev & Fatkullina, 2021), who studied the processes of collecting, recording and analysing data on their inventory system, found that the pilot implementation of the inventory system improved equipment monitoring, reduced labour costs and the number of errors in the preparation of inventory lists. Similarly, the findings of Ho *et al.* (2021) who developed a blockchain-based system operating under a decentralised accounting mechanism, improved the quality of traceability data and the exchange of reliable information within the spare parts supply chain.

The accuracy and completeness of information regarding educational institution goods significantly improved. The data now remains error-free, unaffected by process distortions, and exhibits consistency between physical and virtual records. Additionally, the software has introduced secure data access mechanisms, granting or restricting personnel access based on their designated roles as administrators or managers. This is in line with (Fajardo & Lorenzo, 2017), who managed to highlight the result of obtaining truthful information to maintain the optimal inventory, thus achieving optimal and accurate customer service, all as a result of the implementation of the web system. Similarly (Bonett *et al.*, 2019), reported a reduction in inventory loss due to stock-outs and increased inventory service levels. Their primary objective was to address stock-out issues in SMEs, which previously lacked such effective tools. Similarly Praveen *et al.* (2019), show that the development of a model using artificial neural networks to accurately predict demand contributed to sudden customer demand and minimised the mismatch between supply, demand and associated costs, resulting in increased profit margins. In turn, this is in line with (De Giovanni, 2021), where the implementation of an intelligent application allows the supply chain to increase sales and improve the production rate, as more consistent and reliable information was obtained from the managed inventory.

Effective reporting saw significant improvement, facilitating better communication between the educational institution and UGEL 08 Cañete, thereby aiding the objectives of both entities. Moreover, it furnishes UGEL 08 Cañete with precise and high-quality information to make informed organizational decisions with the educational institution's resources. This is in line with (Rosas & Valecilla, 2019), who pointed out that after the phase following the implementation of a web system in inventory management, operations were optimised in terms of response times for receiving reports and monitoring administrative processes. Similarly (Guevara, 2019), claimed that, after the development of an inventory management system, it was possible to control materials in a more orderly manner, providing timely and reliable reports for correct and appropriate decisions. The results showed a high degree of agreement with the research of (Dennert *et al.*, 2021), where it was demonstrated that the use of a universal inventory system allows the rapid generation of physical inventory reports, which in turn preserves the quality of the sample by reducing redundancy and location time. Inventory information was presented in a more user-friendly manner, allowing it to be easily analysed for statistically significant trends, samples had reliable traceability and data was checked for accuracy.

Conclusions

The web system has significantly improved the inventory control process at the José Buenaventura Fernández Public Educational Institution. After its implementation, the software demonstrated notable enhancements in the three dimensions proposed (search for goods, inventory coverage, and inventory reports). These improvements have greatly benefited the school by optimizing the inventory control process.

Finally, it is recommended that this research be applied in other schools, both public and private, in order to improve and have access to accurate and rapid information on the movable and immovable goods of the institution, since the SBN regulations are applied. At the same time, it is recommended to extend the methods with QR code or barcode, in order to optimise the time of the inventory, and at the same time, this functionality should communicate with the web system of the inventory control process and, for a future stage, consider a connection with the National Goods System of the Ministry of Education.

Data availability

Underlying data

The data supporting this research can be found in the “app/database/seedes/data” folder of this repository under the filename “goods-data.csv.” Additionally, a snapshot of the data is archived and available on Zenodo under the following DOI: <https://doi.org/10.5281/zenodo.10041267> (Ramos-Miller (b), 2023).

Data are available under the terms of the [Creative Commons Attribution 4.0 International license](https://creativecommons.org/licenses/by/4.0/) (CC-BY 4.0).

Software availability

Ramos, M. y Pacheco, A. Towards Inventory Control Excellence: An innovative approach based on a web-based platform.

- Source code available from:
 - Backend: <https://github.com/mmartinrm97/api-sepulveda/releases/>
 - Frontend: <https://github.com/mmartinrm97/frontend-sepulveda-notus/releases/>

- Archived source code at time of publication:
 - Backend: <https://doi.org/10.5281/zenodo.10041267> (Ramos-Miller (b), 2023)
 - Frontend: <https://doi.org/10.5281/zenodo.10023279> (Ramos-Miller (a), 2023)
- License: [MIT License](#)

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The authors have corrected the manuscript properly and no more corrections are needed.

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 27 February 2024

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Andy Reyes

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The research methodology is very well applied.

The scope is delimited to the educational sector and the research objectives are limited to them, maintaining correct traceability of the research elements.

The project modules are focused on use cases, although it is a traditional approach, it meets what is necessary to facilitate the design, construction, implementation and maintenance of the proposed system for inventory management in this research.

Is the rationale for developing the new software tool clearly explained?

Yes

Is the description of the software tool technically sound?

Yes

Are sufficient details of the code, methods and analysis (if applicable) provided to allow replication of the software development and its use by others?

Yes

Is sufficient information provided to allow interpretation of the expected output datasets and any results generated using the tool?

Yes

Are the conclusions about the tool and its performance adequately supported by the findings presented in the article?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Red Hat Certified Architect - RHCA, Linux, OpenSource, Software Development, IaaS, PaaS, SaaS, CaaS, IT Automation

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

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The authors highlight the importance of inventory management in educational institutions and the challenges associated with it. The work reflects a careful and thoughtful approach to optimising the management of educational facilities through information technology. The decision to use information technology to improve inventory processes demonstrates a dynamic response

to current needs.

However, before accepting the manuscript for indexing, the authors should provide more details on the specific information technologies used during implementation, as well as the evaluation criteria used during system review. This could enhance understanding of the effectiveness and applicability of the system developed.

Is the rationale for developing the new software tool clearly explained?

Yes

Is the description of the software tool technically sound?

Yes

Are sufficient details of the code, methods and analysis (if applicable) provided to allow replication of the software development and its use by others?

Yes

Is sufficient information provided to allow interpretation of the expected output datasets and any results generated using the tool?

Yes

Are the conclusions about the tool and its performance adequately supported by the findings presented in the article?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Data processing

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 11 Dec 2023

Alex Pacheco

This new version provides more details on the specific information technologies used during implementation, as well as the evaluation criteria used during the system review. Information on development technologies, strategic plug-in integration, technological details for indexation consideration and evaluation criteria during system review has been added.

Competing Interests: No competing interests were disclosed.

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