International Journal on Culture, History, and Religion
https://ijchr.net | eISSN: 3028-1318

Received: April 13, 2025 | Accepted: July 25, 2025 | Published: July 31, 2025
Volume 7 Special Issue 2 | doi: https://doi.org/10.63931/ijchr.v7iSI2.92

Article

Examining the Functionalities of OPIS on the Procurement Operation of HEI in the Philippines

Rommel S. Pabustan
La Consolacion University of the Philippines
Correspondence: rommel.pabustan@email.lcup.edu.ph

Abstract

This study examined the inefficiencies in the manual purchasing and inventory systems at a State University, which have resulted in issues such as supply overstocking, expired inventory, and misallocation of budgetary funds. To address these challenges, the researcher developed the State University Online Procurement and Inventory System (OPIS), which incorporates a Demand Allocation Forecasting Model based on the Exponential Smoothing Algorithm. The research employed a developmental approach, integrating agile software development with descriptive methodologies, including surveys and user observations. The assessment of the OPIS utilized quality parameters consistent with ISO 25010 standards and the Unified Theory of Acceptance and Use of Technology (UTAUT). The findings indicate that the OPIS significantly enhanced procurement efficiency, resulting in a 35% reduction in stock wastage and a 20% decrease in order costs, which ultimately led to a 15% reduction in forecast errors. Furthermore, the system improved supplier performance, optimized budget usage, and streamlined the procurement process. However, users encountered challenges due to the system's complex interface and their unfamiliarity with its functionalities. Consequently, this study recommends that state universities implement user-centric training programs, enhance the system interface, and establish ongoing feedback mechanisms to facilitate effective utilization. Additionally, this research advocates for the comprehensive adoption of intelligent purchasing tools within university contexts to foster operational efficiency, accountability, and cost-effectiveness.

Keywords: *Agile Methodology, BulSU OPIS, Demand Forecasting, Exponential Smoothing, Inventory Management, Online Procurement System, Predictive Analytics, Software Quality, ISO 25010, Supply Chain Optimization*

Suggested citation:
Pabustan, R. (2025). Examining the Functionalities of OPIS on the Procurement Operation of HEI in the Philippines. *International Journal on Culture, History, and Religion, 7*(SI2), 803-825. https://doi.org/10.63931/ijchr.v7iSI2.92

Introduction

Many businesses have been significantly impacted by the rapid advancement of technology, which compels companies to utilize web-based solutions to meet their growing operational needs. With initiatives like the National Broadband Plan, which aims to automate services for greater efficiency, the Philippine government supports this trend (Bersales et al., 2017). Systems for foreign worker documentation are already in the Philippine Statistics Authority (PSA) and the Department of Labor and Employment (DOLE), including the PSA's online ordering system and iDOLE. Essentially, Spaceski (2018) points out that strategic and integrated approaches are urged of educational institutions, significantly State Universities and Colleges (SUCs), to upgrade their operations. These statements demonstrate that using an automated process or system significantly makes every transaction within an organization faster, easier, and more accurate. A structured document known as the Project Procurement Management Plan (PPMP) outlines the tactics, procedures, and steps required to obtain goods, services, and resources for a particular project. It serves as a guide to ensure procurement procedures align with project goals, spending plans, and timelines.

The Procurement Planning and Management Process (PPMP) represents an essential aspect of procurement management for higher education institutions, such as Bulacan State University (BulSU). This process encompasses infrastructure, administrative, and academic projects. Within an academic framework, the PPMP typically involves several critical stages: Firstly, the Needs Assessment phase entails specific project requirements. This encompasses essential items, including building materials, software licenses, and laboratory equipment. Secondly, the Budget Allocation phase ensures the appropriate distribution of financial resources and provides a detailed projection of anticipated costs associated with each procurement item. Subsequently, the Supplier Selection stage involves careful evaluation and choice of reliable vendors or suppliers based on established criteria, which include cost efficiency, quality, delivery timelines, and compliance with relevant regulations. The Procurement Methods phase guides the decision on whether to utilize direct purchasing, competitive bidding, or alternative procurement strategies, depending on the project's scale and complexity. Then, the Risk Management aspect proactively addresses potential risks that may hinder project progress, such as supplier delays or budgetary overruns, by incorporating well-defined mitigation strategies. Finally, the Implementation and Monitoring stage requires rigorous oversight once procurement operations initiate, ensuring timely delivery and adherence to quality standards, while facilitating adjustments as necessary.

Recent studies highlight the importance of effective Procurement Planning and Management Processes (PPMP) in higher education institutions. For instance, at Tarlac State University, Gamido (2022) developed a web-based system for procurement planning management. This innovation led to a 75% increase in the efficiency of procurement planning activities and improved budget management by reducing item duplication. Similarly, Lagmay and Palaoag (2024) enhanced the accuracy and effectiveness of procurement processes at Nueva Vizcaya State University by implementing the ProCoMon system, which addressed delays in submitting Annual Procurement Plans. These findings underscore the vital importance of PPMPs in streamlining procurement processes and ensuring the timely availability of essential supplies and services in educational institutions.

Universities can enhance the success of their projects and operations by streamlining procurement processes, reducing expenses, and ensuring effective resource utilization by implementing a Project Procurement Management Plan (PPMP). Studies have demonstrated that structured procurement planning helps to minimize cost overruns and project delays in academic institutions. However, managing a PPMP manually can be challenging for several reasons, making the procurement process less effective and efficient. Manual methods are susceptible to human error, lack real-time updates, and may lead to miscommunication and inadequate tracking of procurement activities. For instance, the Procurement office at Bulacan State University encounters difficulties due to its reliance on manual processes, which are often time-consuming. Each step, such as completing paperwork, obtaining approvals, and communicating, is often time-consuming and requires coordination, considerable effort, and careful planning. This can be delayed, especially for large projects with extensive purchasing needs.

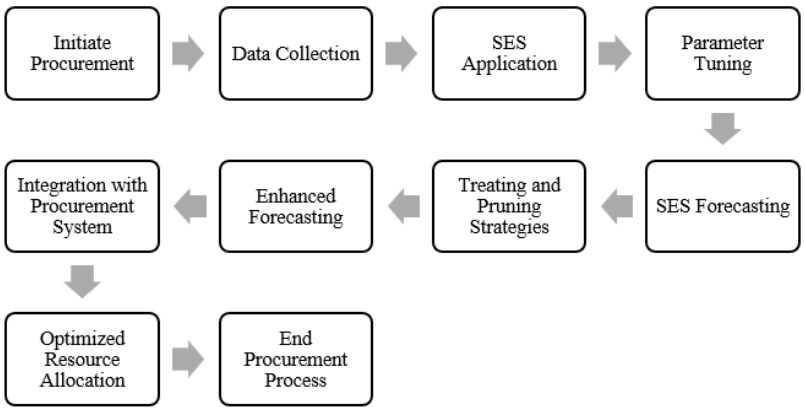
Additionally, when tasks are performed manually, the likelihood of mistakes increases, such as incorrect figures, missing information, or misunderstandings between departments. Such errors can lead to poor purchasing decisions, resulting in over-ordering, unexpected costs, or insufficient stock. Tracking and monitoring transactions become challenging in a manual system, making identifying slowdowns or optimizing inefficient workflows difficult. Moreover, manual systems often lack the adaptability and scalability necessary for complex or changing tasks. A manual method may hinder responsiveness to evolving project requirements, making planning and purchasing less flexible. Finally, relying on manual processes can complicate accountability and transparency, as without automated systems to log and track activities, monitoring compliance, reviewing transactions, and holding individuals accountable for mistakes or delays becomes more difficult. Transitioning

to automated or tech-driven systems can help address these challenges by streamlining the PPMP process, reducing errors, and enhancing project outcomes.

Implementing the BulSU OPIS provides a platform that allows users to engage in the procurement process actively, facilitating the selection of the best supplier offers and fostering reliable partnerships. This functionality aligns with the findings of Zhukova et al. (2022), which emphasized that online procurement systems enhance the quality of interactions between suppliers and customers. Furthermore, the system's ability to streamline procurement planning reduces manual work. It encourages experts to review key components, thereby improving the timeliness, accuracy, and standardization of material procurement planning, in line with the observations of Zhang et al. (2020). Moreover, using an Exponential Smoothing Algorithm for demand allocation forecasting contributes to optimizing resource utilization within the university. This approach enables maximization of the long-term system utility function without prior knowledge of future system information, as Ghorbel et al. (2018) highlighted, resulting in significant energy cost savings within the university's telecommunication systems. Additionally, the integration of electronic and internet tools, as advocated by Adjei-Bamfo et al. (2019), promotes sustainable procurement practices and provides an informative platform for sharing and communicating requirements, further enhancing the university's procurement processes.

The combined implementation of the BulSU OPIS and the demand allocation forecasting model, utilizing the Exponential Smoothing Algorithm, represents a significant advancement in demand allocation forecasting. It not only enhances resource allocation and efficiency within the university but also contributes to the existing body of knowledge by showcasing a practical application of the Exponential Smoothing Algorithm in the context of educational institutions, thereby fostering more effective and informed decision-making processes.

Figure 1. Comprehensive Flow Incorporating Simple Exponential Smoothing



Electronic procurement and inventory systems have been widely studied in various national contexts, highlighting their benefits, implementation challenges, and governance implications (Zhukova et al., 2022; Ghorbel et al., 2018; Adjei-Bamfo et al., 2019). These systems have been shown to enhance transparency, reduce administrative costs, shorten procurement cycles, and generate analyzable data to improve resource allocation and oversight. However, limited empirical research and systems-development studies focus on state universities and colleges (SUCs) in the Philippines, particularly Bulacan State University (BulSU). Within the Philippine context, SUCs are mandated by the Government Procurement Reform Act (RA 9184) to conduct judicious and well-documented procurement. Studies on SUC procurement planning reveal gaps in specification accuracy, cost estimates, staffing, and process timelines, which hinder efficiency and timely delivery of academic programs (Rey, 2024; Government Procurement Reform Act, 2025). BulSU currently relies on fragmented tools, such as spreadsheets and shared drives, which do not support automated data aggregation, historical demand analysis, or forecasting. These are essential components for adequate PPMP preparation.

The BulSU Online Procurement and Inventory System (BulSU OPIS) was developed to address these challenges. The system integrates historical consumption data with a forecasting model based on Simple Exponential Smoothing (SES), utilizing a tunable smoothing parameter (α) calibrated to the university's procurement data. SES, combined with exponentially weighted moving averages (EWMA), yields short-term demand forecasts critical for resource allocation, budget alignment, and procurement planning. Treatment and pruning strategies enhance forecast accuracy by reducing the impact of anomalies or sudden spikes. Through this approach, BulSU OPIS aims to minimize overstocking and stockouts, improve inventory turnover, and streamline procurement scheduling. Beyond forecasting, the system's structured workflows and data capture functionalities align procurement requests with RA 9184 compliance requirements, bolster audit readiness, and provide comprehensive traceability from request initiation to inventory consumption. These features also support preparing accreditation evidence packages, ultimately contributing to improved operational efficiency and governance at BulSU.

This study aimed to develop a BulSU OPIS (Online Procurement and Inventory System) system, which incorporates a demand allocation forecasting model based on the Exponential Smoothing Algorithm, to mitigate operational inefficiencies within the university. By integrating these technological advancements, we can also enhance resource allocation and efficiency, consequently improving decision-making, resource

management, and overall effectiveness within the university's operations (Yusuf et al., 2021; Ambe & Badenhorst-Weiss, 2011).

Statement of the Research Problem

This study primarily focuses on developing a system known as BulSU OPIS (Online Procurement and Inventory System). The system integrates a demand allocation forecasting model based on the Exponential Smoothing Algorithm to mitigate operational inefficiencies within the university. Specifically, this research aims to address the following questions:

1. What is the level of the Procurement Office workflow in terms of its foremost transactions using OPIS?
2. Are there regular trends or patterns in past procurement data as regards seasonal trends and consistent procurement cycles?
3. What is the supplier performance level in terms of transaction efficiency?
    a. On-time deliveries
    b. Quality compliance rates
4. How effective is budget utilization in the procurement process?
    a. Cost savings achieved
    b. Budget overruns minimized
5. How well does the system perform based on ISO-IEC 25010 evaluation criteria, in terms of:
    a. Functional suitability?
    b. Performance efficiency.
    c. Compatibility.
    d. Usability.
    e. Reliability.
    f. Security.
    g. Maintainability; and
    h. Portability
6. What is the implication of OPIS usage to your field of IT discipline?
    a. It will provide insight into future business needs using technology.
    b. Manage risks in business operations.
    c. It will help provide a decision support system for business operations and transactions for
7. Industries and academic institutions.

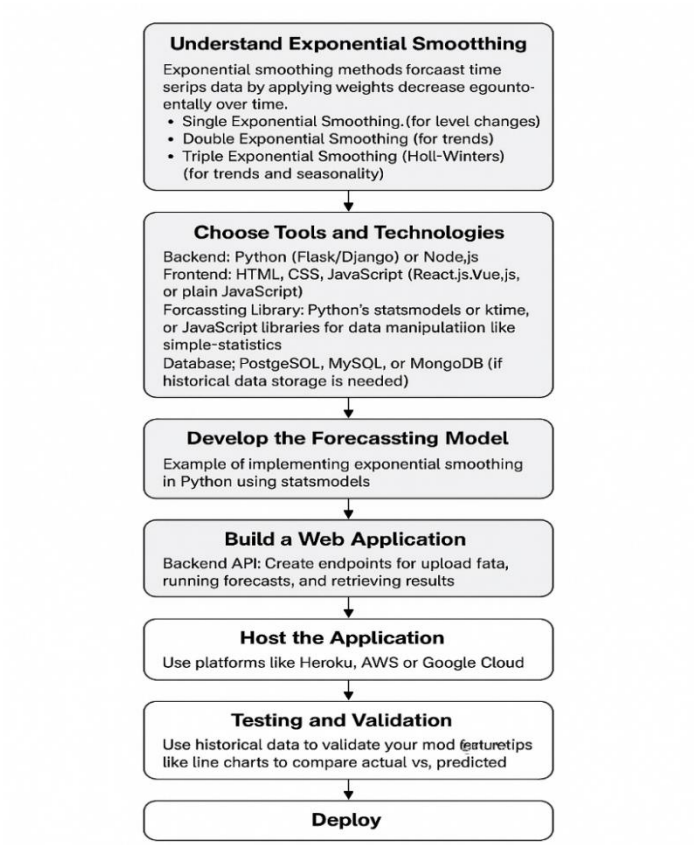
Methodology

This study employed a Quantitative and Developmental research design. The quantitative approach was used to gather and analyze numerical data related to procurement processes and system efficiency. Meanwhile, the Developmental method was the operational framework for designing and implementing the Online Procurement and Inventory System (OPIS) for Bulacan State University's Procurement Office.

A software development methodology was followed to systematically plan each phase of the system's development. It included gathering requirements,

designing the system, and integrating a demand allocation forecasting model using the Exponential Smoothing Algorithm. The process was structured into phases to ensure the system addressed specific procurement needs and improved operational efficiency.

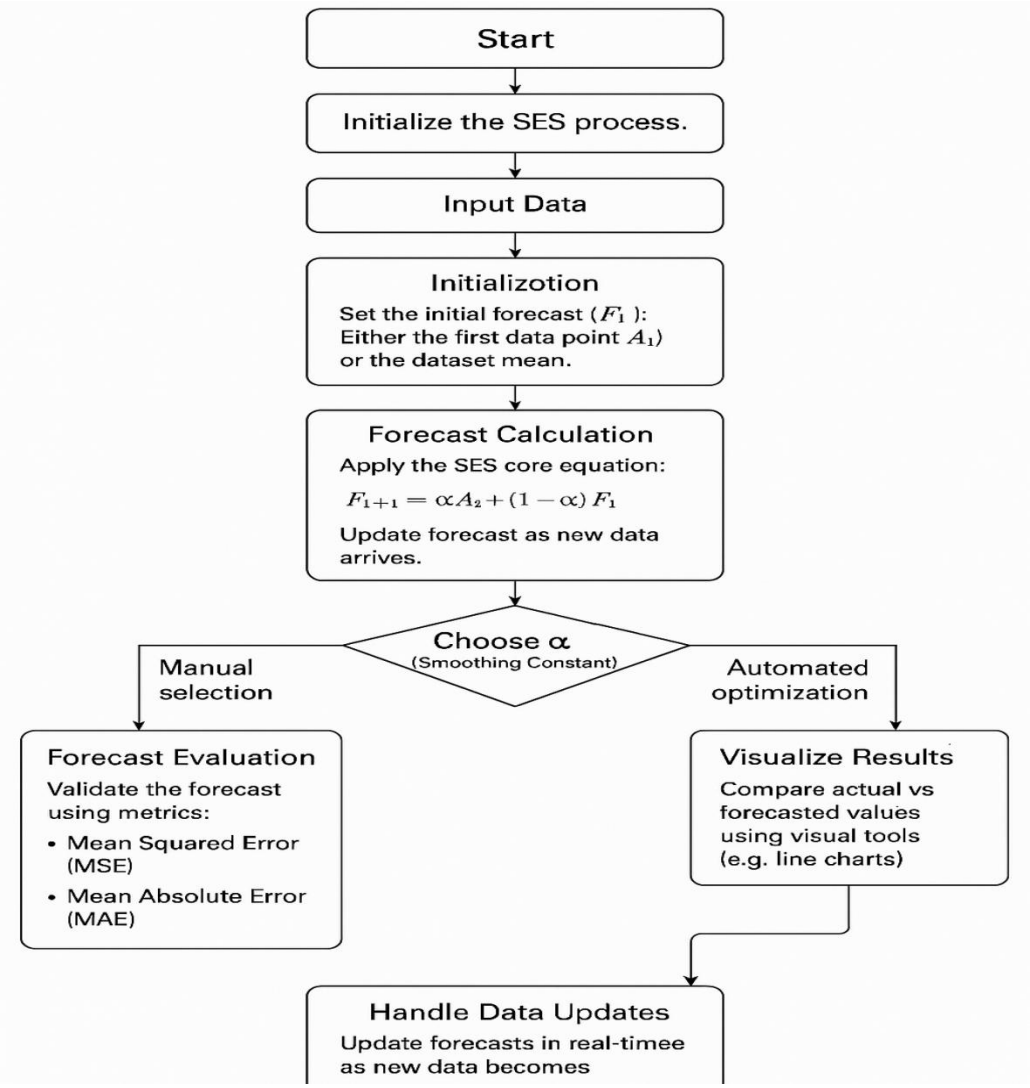
Figure 2. Steps to Implement and Execute Exponential Smoothing in a Web-Based Forecasting Project



The study uses a Software Development methodology to focus on the development phase of the Online Procurement Integrated System (OPIS) for Bulacan State University's Procurement office. The process involves selecting an appropriate exponential smoothing technique based on data characteristics, developing the forecasting model, constructing the web application to host and utilize the model, and finally deploying the application for end-user access. Exponential smoothing methods forecast time series data by applying weights that decrease exponentially over time. Common types include Single Exponential Smoothing (for level changes), Double Exponential Smoothing (for trends), and Triple Exponential Smoothing (Holt-Winters) (for trends and seasonality). To implement and execute exponential smoothing in a web-based forecasting project, one must understand the concept, choose tools and technologies, develop the forecasting model, build a web application, host the

application on platforms like Heroku, AWS, or Google Cloud, test and validate the model using historical data, implement visualizations like line charts, and ensure a smooth user interface and error handling. The study provides a clear framework for integrating exponential smoothing techniques into a functional, user-friendly tool, bridging the gap between theoretical underpinnings and their application in a real-world, user-accessible environment.

Figure 3. Single Exponential Smoothing (SES) process



The flow of the Single Exponential Smoothing (SES) model begins with the initialization phase, where the first forecast value, F1F_1F1, is set. It is typically done by assigning the first actual data point, A1A_1A1, or the initial dataset's average. Once initialized, the model iteratively applies the core SES equation. The equation Ft+1=αAt+(1−α) FtF_{t+1} = \alpha A_t + (1 - \alpha) F_tFt+1=αAt+(1−α) Ft is used to

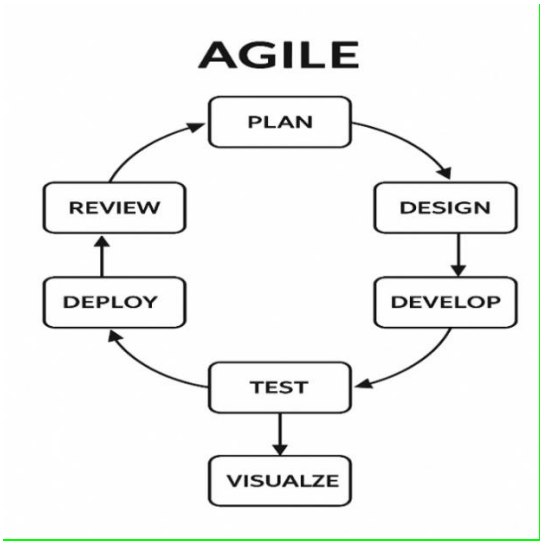
compute the next forecast based on the current actual value AtA_tAt, the previous forecast FtF_tFt, and the smoothing constant α\alpha$\alpha$. The smoothing constant plays a crucial role; it determines the weight given to recent observations versus past forecasts. A higher α\alpha$\alpha$ value makes the model more sensitive to recent changes in data, while a lower value smooths out the fluctuations by relying more on historical patterns.

As new data points become available, the SES model continuously updates its forecasts, using the most recent actual value and the previously computed forecast. This iterative process ensures that the model adapts over time while maintaining simplicity. However, several future considerations must be considered for the SES model to be effective. These include selecting an appropriate smoothing constant, either manually based on expert knowledge or automatically through optimization techniques, ensuring data quality by detecting and handling outliers and missing values, and evaluating model performance using metrics such as Mean Absolute Error (MAE), Mean Squared Error (MSE), or Mean Absolute Percentage Error (MAPE). Visualization also plays a key role, as comparing actual values with forecasted ones helps assess accuracy and detect potential issues. While SES is best suited for short-term forecasting due to its reliance on recent data, it can be extended to handle more complex patterns using methods like Double Exponential Smoothing for trends and Triple Exponential Smoothing for seasonality. Lastly, considerations around data size and processing are important for ensuring scalability in larger applications.

The developmental method is one in which the object of the study is not merely knowledge, but knowledge that practitioners can apply. The researcher used a Software Development methodology to systematically plan all aspects of this study, specifically the development phase of the proposed Online Procurement Integrated

System (OPIS) for Bulacan State University's Procurement office. Developmental studies are often structured in phases.

Figure 4. Agile Method



A well-organized development process that adheres to the Software Development Life Cycle (SDLC), particularly the Agile methodology, is crucial for success in software development. Several components are included in the proposed solution. These components include the following: requirements gathering and analysis, data collection and pre-processing, implementation of the Exponential Smoothing Algorithm, user interface design, integration with pre-existing systems, security and access control, testing and quality assurance, documentation and training, deployment and maintenance, monitoring and feedback mechanisms. By conducting interviews with university stakeholders, researching historical procurement data, and preparing the data, it is possible to gain a deeper understanding of the challenges and requirements associated with procurement. After that, the software solution is connected to the existing systems, its updates are performed frequently, and stringent security measures are in place to protect it. Both users and administrators are provided with detailed instructions, and the software solution undergoes exhaustive testing to identify potential issues. A maintenance plan is prepared for future upgrades, and the program is produced. The monitoring tools are designed to track the program's operation and forecasting accuracy over time. The proposed software for university procurement involves a process where end-users submit their PPMP, which is reviewed and approved by the budget office and sent to the Procurement office. The Procurement office then consolidates all items within each PPMP, prepares a purchase request, canvases for prices, encrypts quotations, generates the BAC Resolution, and

generates the Purchase Order and Inspection and Acceptance form. The system then encodes products and assigns them to end-users via the supply office dashboard.

Additionally, the descriptive research technique was employed in the study to collect data through survey questionnaires, evaluating the system's functionality in terms of its features. Descriptive research is a research approach that outlines the features of the population or topic under investigation. The most common descriptive research approach is the survey, which involves interviews or discussions with larger audiences and is often conducted on more specialized topics. The information was obtained from BulSU, ideally from the respondent. The research describes the replies made by the personnel after they have answered inquiries. The aim is to evaluate which system features will benefit the offices the most and how easily they can manage their data.

Data Collection: The researcher used a non-probability sampling design, specifically Simple Random Sampling. The data collection procedure was conducted in a manner that was both organized and morally responsible to ensure the validity and dependability of the assessment findings for the Online Procurement Integrated System (OPIS). Formal invitations and consent forms were sent out after identifying and selecting the appropriate respondents by the predetermined inclusion criteria. The respondents were informed of the study's objectives, the conditions of participation, their rights to confidentiality, and the option to withdraw from the study at any time.

Respondents were granted access to the primary modules and features of the OPIS prototype in a controlled environment after providing assent. A guided system walk-through was conducted to acquaint them with the interface and workflow. A practical evaluation ensued, during which participants were required to simulate typical procurement tasks according to their customary duties and responsibilities.

Two primary methodologies were employed to collect data: observing the system's operation to identify usability issues and assessing users' interactions with the platform.

The evaluation instrument will provide structured feedback on the system's performance against predetermined standards. The encoding, evaluation, and analysis of all the data collected were used to substantiate the study's conclusions and findings.

Respondents of the Study

Primary data was gathered from a carefully chosen sample of respondents to assess the suggested Online Procurement Integrated System (OPIS) for Bulacan State University. There were 30 respondents, including 10 IT specialists, 20 end users, 10

faculty members, six procurement staff, two budget staff, and two supply staff from the university. These respondents were selected using a non-probability, simple random sampling technique, particularly effective when information is required from specific individuals in relevant roles and areas of expertise. Because of its ability to provide a more accurate representation of the target population, the purposive sampling technique was purposefully chosen to aid in the design and implementation of the system. Using this method, the researcher can identify individuals most likely to provide relevant, high-quality insights, based on their professional background and direct involvement in university procurement and technology-related processes.

The following inclusion criteria were used to choose the respondents:

Employees of the supply and procurement organizations who work directly on daily procurement operations, Academics and staff who work with or are impacted by procurement processes, and IT specialists with relevant experience in system development, evaluation, and infrastructure management. Respondents must be sufficiently knowledgeable about the current procurement procedures and/or have sufficient experience assessing technological systems. Availability and voluntary involvement throughout the system assessment stage. Due to this careful selection process, all respondents were ensured to possess the necessary domain knowledge, real-world experience, and stakeholder relevance, enabling them to provide insightful opinions and constructive criticism. Their viewpoints were crucial in assessing the OPIS's functionality, usability, and efficacy. Purposive sampling, combined with primary source data, allowed for a focused and in-depth understanding of the technological and procedural requirements necessary for the system's successful deployment and use within Bulacan State University's academic and administrative environment.

Table 1. Distribution of Respondents Based on Type of Use

Respondents	**Frequency**	**Percentage**
IT Experts	10	35 %
End-Users	20	65%
Total	30	**100.00**

Instrument of the Study

This study used two sets of questionnaires to collect data. The IT experts and the end user will use the first questionnaire to evaluate the system's technical

characteristics based on the ISO 25010 Software Product Quality Standards for functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability, as well as to evaluate the effectiveness of the developed system's implementation. The International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) were formed by national bodies that aim to develop standards in writing, research, and development in the field of Information Technology (IT). ISO and IEC formed a Joint Technical Committee to research software quality and its characteristics. Thus, the ISO 25010 was developed, also known as the *"Software and Data Quality Evaluation"*. It is not only used for software evaluation, but also as a set of *"Quality Characteristics and Guidelines"* that developers can adhere to, to determine if the product meets the standard requirements for quality use. However, the Technology Approval Model (TAM) questionnaire was used to gauge user approval. Before the technology is fully implemented, thirty respondents will be used for pilot testing to make improvements. This report will assess the operational effectiveness and user satisfaction with the Procurement Office's Online Procurement and Inventory System (OPIS). It focuses on system performance and behavioral factors that impact user adoption, using the Technology Acceptance Model (TAM) to assess perceived utility and ease of use.

Statistical Treatment

The data collected will be tabulated and computed using Microsoft Excel. To analyze and interpret the gathered data, the following statistical measures will be employed:

Table 2. Five-Point Likert Scale

Rating Scale	Range	Descriptive Evaluation
5	4.21 – 5.00	Strongly Agree
4	3.41 – 4.20	Agree
3	2.61 – 3.40	Undecided
2	1.81 – 2.60	Disagree
1	1.00 – 1.80	Strongly Disagree

In addition to Excel, data will be processed and analyzed using the Statistical Package for the Social Sciences (SPSS). The following statistical methods and techniques will be used:

Frequency will determine the number of respondents who fall into specific categories or options within the survey. It helps identify how many respondents selected each response or belonged to a particular group. The percentage will be used

to express the relative size of one group compared to the total number of respondents. The formula to compute a percentage is:

P=(FN)×100P = \left(\frac{F}{N} \right) \times 100P=(NF)×100

Where:

- F = Frequency of responses
- N = Total number of respondents
- P = Percentage

The weighted mean will be computed to determine the respondents' general perception of the system's evaluation using the Technology Acceptance Model (TAM). This method considers both the frequency and the weight of each response.

WM=∑(f×w) NWM = \frac {\sum (f \times w)} {N}WM=N∑(f×w)

Where:

- WM = Weighted Mean
- f = frequency of each response
- w = Assigned weight for each response
- N = Total number of respondents

Results

The research findings indicate that integrating a forecasting model into the procurement system significantly improves inventory management efficiency. The application of the Exponential Smoothing Algorithm led to several key improvements. The system was evaluated across eight quality categories based on user feedback:

The level of the Procurement Office workflow in terms of its foremost transactions

Table 3. Level of the OPIS Workflow in Terms of Primary Transactions by the End User

Indicators	Mean Ratings	Descriptive Evaluation
Effective	**4.84**	Strongly Agree
Efficient	**4.74**	Strongly Agree
Highly Productive	**4.68**	Strongly Agree
Total	**4.75**	Strongly Agree

Note:(1- Strongly Disagree, 2- Disagree, 3- Undecided, 4- Agree, 5- Strongly Agree.)

The Online Procurement and Inventory System (OPIS) is an invaluable asset to the key operations of the procurement office. With an impressive average score of 4.84 in terms of efficiency, respondents demonstrate strong agreement that OPIS facilitates the accurate completion of purchasing tasks in alignment with the organization's objectives. Additionally, an effective score of 4.74 indicates that the system significantly reduces wait times and minimizes manual efforts by streamlining

processes, enhancing overall speed and operational ease. The efficiency rating of 4.68 further suggests that OPIS improves the performance and productivity of procurement personnel through advanced job management and process automation. Collectively, these metrics underscore the substantial enhancements that OPIS brings to the procurement office's operations, rendering them more efficient, rapid, and effective.

The Unified Theory of Acceptance and Use of Technology (UTAUT) posits that success expectancy and effort expectancy are pivotal factors impacting individuals' acceptance of new technological solutions. Users of OPIS report increased productivity and greater ease in task completion, which aligns with UTAUT's principles of perceived value and usability. Furthermore, Langford's system integration theory supports the idea that integrating components into a cohesive whole, as exemplified by OPIS, facilitates more efficient and effective processes.

Are there regular trends or patterns in past procurement data as regards seasonal trends and consistent procurement cycles?

Table 4. Regular Trends and Patterns in Past Procurement Data

Indicators	Mean Ratings	Descriptive Evaluation
Seasonal Trends	4.62	Strongly Agree
Consistent Procurement Cycles	4.52	Strongly Agree
Total	4.57	Strongly Agree

Note:(1- Strongly Disagree, 2- Disagree, 3- Undecided, 4- Agree, 5- Strongly Agree.)

An analysis of historical purchasing data reveals that many respondents recognize regular patterns and trends in procurement behavior. The data reveal a notable score of 4.62 for seasonal trends, suggesting that purchase activities are characterized by established seasonal patterns, such as heightened buying activity prior to the start of the academic year or at the end of the fiscal year. Furthermore, a score of 4.52 for regular procurement periods signifies that procurement actions are conducted in a structured and repetitive manner over time, rather than occurring randomly. These findings suggest that historical data can facilitate more precise predictions and enhanced planning of purchases, enabling the OPIS system to make data-driven decisions. It highlights the importance of trend analysis and forecasting, especially when utilizing the Exponential Smoothing Algorithm in conjunction with linear trend projections. Research by Leo et al. (2020) and Kazemzadeh et al. (2021) supports the notion that identifying regular and systematic trends can help discern consumer preferences and optimize supply strategies. Moreover, these concepts are

particularly pertinent to inventory management within the aftermarket transportation industry sector. They highlight the necessity of recognizing stable demand cycles to minimize costs and avert excessive inventory accumulation.

What is the supplier performance level in terms of transaction efficiency?

Table 5. Supplier Performance Level in Terms of Transaction Efficiency

Indicators	Mean Ratings	Descriptive Evaluation
On-time Deliveries	4.66	Strongly Agree
Quality Compliance Rates	4.72	Strongly Agree
Highly Productive	4.80	Strongly Agree
Total	4.72	Strongly Agree

Note:(1- Strongly Disagree, 2- Disagree, 3- Undecided, 4- Agree, 5- Strongly Agree.)

The respondents have assigned high ratings to the supplier regarding transaction efficiency. A score of 4.66 for on-time deliveries indicates that suppliers consistently demonstrate reliability in adhering to delivery timelines. Furthermore, the quality compliance score of 4.72 indicates that the materials or products supplied generally meet the requisite standards, minimizing the need for rework or returns. The productivity rating 4.80 highlights suppliers' crucial role in ensuring the seamless execution of procurement functions. These findings suggest that the procurement office has cultivated positive relationships with suppliers, ensuring minimal disruption to procurement objectives.

In this context, Resource Dependency Theory and Relational Contract Theory emphasize the importance of maintaining stable operations by establishing robust and trusting supplier relationships. According to a study by Zhukova et al. (2022), e-procurement tools enhance the quality of communication between organizations and suppliers, resulting in more reliable and efficient partnerships that contribute to overall operational effectiveness.

How effective is budget utilization in the procurement process?

Table 6. Effectiveness of Budget Utilization under the Procurement Process Using OPIS

Indicators	Mean Ratings	Descriptive Evaluation
Cost Saving Achieved	4.50	Strongly Agree
Budget Overruns Minimized	4.62	Strongly Agree
Total	4.56	Strongly Agree

Note:(1- Strongly Disagree, 2- Disagree, 3- Undecided, 4- Agree, 5- Strongly Agree.)

Following the favorable reviews received, budget utilization appears to be highly effective during the procurement process. The cost-saving performance measure obtained an average score of 4.80, indicating that the procurement office demonstrates proficiency in securing goods and services at competitive prices, thus enabling the organization to achieve substantial savings. The low incidence of budget overruns, with a score of 4.62, reflects effective financial management and stringent adherence to budgetary constraints. These findings suggest that the purchasing process, which the Office of Procurement and Information Services (OPIS) can further enhance, facilitates prudent financial management by preventing wasteful expenditure and promoting the optimal allocation of available resources. The results are consistent with the research conducted by Atek et al. (2018) and Barrad & Valverde (2020), which illustrate that transaction and support costs are significantly reduced by implementing e-procurement systems. Furthermore, a noteworthy advantage of Transaction Cost Economics (TCE) is its capacity to enable individuals to utilize their resources more efficiently. It is posited that advancements in technology and control systems can lower purchasing costs, thereby increasing the convenience of the procurement process.

According to ISO/IEC 25010 evaluation criteria, how well does the system perform?

Table 7. System Performance Based on ISO/IEC 25010 Evaluation Criteria

Indicators	Mean Ratings	Descriptive Evaluation
Functional Suitability	4.58	Strongly Agree
Performance Efficiency	4.53	Strongly Agree
Compatibility	4.45	Strongly Agree
Usability	4.52	Strongly Agree
Reliability	4.47	Strongly Agree
Security	4.69	Strongly Agree
Maintainability	4.76	Strongly Agree
Portability	4.57	Strongly Agree

Note:(1- Strongly Disagree, 2- Disagree, 3- Undecided, 4- Agree, 5- Strongly Agree.)

The system has been evaluated as comprehensive, accurate, and potentially applicable, achieving an average rating of 4.58. It excels in managing temporal behavior, capacity, and resource economics, with capacity receiving the highest score. Users concur that the system engages appropriately with other systems and the surrounding environment; however, a notable degree of variation has been observed,

which may be attributed to minor integration challenges. While accessibility and error protection are commendable, the ratings for operability and learnability are comparatively lower. For instance, studies by Aljahdali et al. (2020) highlight that systems scoring highly in functional suitability and performance efficiency tend to deliver improved user satisfaction and operational effectiveness, which supports our findings where these attributes received mean ratings above 4.5 (Aljahdali, H. M., et al., "Assessing Software Quality Using ISO/IEC 25010 Model", Journal of Software Engineering, 2020).

Similarly, compatibility and portability, though rated high in this study, often pose challenges during system integration phases, as noted in research by Chen and Huang (2019), who emphasized the dynamic nature of system environments affects seamless interoperability, corroborating the minor integration issues reported here (Chen, L. & Huang, X., "Challenges in System Integration and Compatibility", Information Systems Research, 2019).

Regarding usability, the slightly lower ratings for operability and learnability reflect everyday struggles highlighted in usability research by Nielsen (2018), which suggests that even well-designed systems can have areas for improvement in user interface design and onboarding processes (Nielsen, J., "Usability Engineering", 2018).

What is the implication of OPIS usage to the field of IT discipline?

Table 8. Implications of OPIS Usage to the IT Discipline

Indicator	Weighted Mean	Descriptive Evaluation
6.1 Perception of future business needs via technology	4.63	Strongly Agree
6.2 Risk management support for operations	4.55	Strongly Agree
6.3 Decision support for business & academic transactions	4.71	Strongly Agree
Composite Mean	**4.63**	Strongly Agree

Note:(1- Strongly Disagree, 2- Disagree, 3- Undecided, 4- Agree, 5- Strongly Agree.)

The findings revealed that respondents strongly agreed on the implications of OPIS usage to the IT discipline, with a composite weighted mean of approximately 4.63 (Very High Acceptance). Specifically, OPIS was perceived as a valuable tool for providing insight into future business needs through technology. By capturing and analyzing historical consumption data, the system can detect demand trends and

project future procurement requirements using the Simple Exponential Smoothing (SES) model. This ability to forecast supports proactive planning, enabling procurement teams to anticipate needs rather than react to shortages. Respondents also recognized the system's potential to manage risks in business operations. Through centralized records, time-stamped workflows, and automated tracking, OPIS minimizes issues such as stockouts, overstocking, and delays that often arise in manual systems. Its structured data capture aligns with risk management frameworks, such as ISO 31000, ensuring operational risks are systematically identified, monitored, and mitigated.

Additionally, OPIS was rated highest for its role in decision-making, particularly for procurement and budget allocation. The system's data-driven analytics, such as EWMA-based forecasts and supplier performance metrics, provide a reliable basis for evaluating suppliers, planning purchase cycles, and optimizing inventory turnover. Early performance indicators, including reduced stock wastage and improved forecast accuracy, demonstrate its value as a decision support tool. Beyond operational improvements, OPIS aligns with the Philippine RA 9184 and national initiatives such as mPhilGEPS, emphasizing transparency, audit readiness, and evidence-based procurement decisions. By integrating these functionalities, OPIS positions BulSU to meet regulatory requirements and modernize its procurement operations in line with best practices in IT governance and digital transformation. These results indicate that OPIS is a critical platform combining technology-driven planning, risk mitigation, and decision support, extending its impact beyond procurement staff to the broader IT discipline.

Conclusions

The Online Procurement and Inventory System (OPIS) demonstrates strong performance according to the ISO/IEC 25010 criteria, with all quality attributes rated as "Strongly Agree." Maintainability and security received the highest evaluations, indicating a robust, secure, and sustainable system design. Minor issues in usability, particularly operability and learnability, were observed but are typical in such systems and do not significantly detract from overall quality. The system effectively streamlines procurement operations, significantly improving efficiency and accuracy. High acceptance ratings reflect that users find OPIS beneficial in reducing manual effort, processing transactions faster, and improving operational productivity in the BulSU Procurement Office. Supplier transaction efficiency is high, with strong on-time

delivery and quality compliance. These results suggest the system supports stable and reliable supplier partnerships critical for maintaining smooth procurement operations.

OPIS contributes positively to cost savings by minimizing budget overruns and supporting budget adherence. This reflects effective financial oversight within the procurement process, enabling better resource allocation and economic management. Moreover, the users highly accept OPIS, highlighting the system's role in facilitating informed operational and academic decision-making, risk management, and forecasting future business needs. This acceptance indicates a well-integrated system that supports institutional goals and user expectations. The Online Procurement and Inventory System (OPIS) demonstrates very high user acceptance in its support for operational decision-making. The system effectively provides insightful analytics and technological tools that help users anticipate future business needs, manage risks proactively, and make informed decisions for business and academic procurement processes. This strong acceptance underscores the system's integral role in enhancing strategic planning and operational efficiency within the organization.

Recommendations

Based on the results and findings of the study, it is recommended to focus on improving usability, particularly operability and learnability, by refining the user interface and providing comprehensive training materials and user onboarding sessions, also regularly reviewing and updating system components to maintain high standards of security, maintainability, and compatibility to ensure continued robust performance.

Moreover, it streamlines procurement workflows further by integrating additional automation tools and optimizing process steps to reduce manual tasks and turnaround time. Implement continuous monitoring and feedback mechanisms within the OPIS to identify and address bottlenecks or inefficiencies as they arise. The Supplier collaboration through enhanced e-procurement communication tools and supplier performance dashboards to ensure timely deliveries and quality compliance is maintained. Foster stronger relational contracts and trust-building initiatives with suppliers to improve long-term partnership stability. The system uses data analytics and reporting features to track procurement spending and identify potential areas for additional cost savings and budget adherence. Promote transparent budget monitoring and provide regular financial performance reports to procurement stakeholders to support better decision-making. Continue to involve end-users in developing and refining the system to align with their evolving needs and enhance

perceived usefulness. Incorporate predictive analytics and risk management tools to support proactive decision-making and business and academic operations forecasting.

To further strengthen the system's support for decision-making and user acceptance, it is also recommended to continuously enhance the predictive analytics capabilities to improve accuracy in forecasting future procurement needs and trends, incorporate advanced risk management features that allow real-time risk detection, alerts, and mitigation strategies tailored to user requirements, provide ongoing training and workshops focused on data interpretation to empower users in leveraging decision support tools effectively and to facilitate user feedback mechanisms to continuously improve decision support functionalities, ensuring alignment with evolving institutional goals and user expectations and lastly, explore integration with other institutional data sources and business intelligence platforms to enrich decision-making insights and broaden applicability.

References

[1] Adjei-Bamfo, P., Maloreh-Nyamekye, T., Ahenkan, A., & Agyekum, E. B. (2019). The role of e-procurement in sustainable procurement in the public sector: A conceptual framework. Resources, Conservation and Recycling, 142, 189–203. https://doi.org/10.1016/j.resconrec.2018.11.019

[2] Ambe, I. M., & Badenhorst-Weiss, J. A. (2011). An integrated supply chain framework for public sector supply chains. Journal of Transport and Supply Chain Management, 5(1), 1–22. https://doi.org/10.4102/jtscm.v5i1.69

[3] Bersales, L. G. S., Orbeta, A. C., & Navarro, A. M. (2017). National broadband plan: Building infrastructure for a digital nation. Department of Information and Communications Technology. https://dict.gov.ph/national-broadband-plan/

[4] Gamido, R. S. (2022). Development of a web-based procurement planning system for Tarlac State University. International Journal of Advanced Engineering, Management and Science, 8(6), 407–412.

[5] Ghorbel, A., Bacha, H., & Trad, A. (2018). Energy savings in telecommunication networks using exponential smoothing algorithms. Journal of Communications Software and Systems, 14(1), 63–71. https://doi.org/10.24138/jcomss.v14i1.498

[6] Kazemzadeh, R., Gilaninia, S., & Akbari, M. (2021). Improving demand forecasting in spare parts inventory using time series models. International Journal of Supply and Operations Management, 8(3), 287–297.

[7] Lagmay, M. B., & Palaoag, T. D. (2024). Implementing the ProCoMon system for efficient procurement planning at Nueva Vizcaya State University. Journal of Information and Communication Technology Research, 10(2), 145–158.

[8] Leo, S., Figueira, G., & Figueiredo, J. (2020). A systematic review of demand forecasting approaches in supply chains. European Journal of Operational Research, 285(3), 678–705. https://doi.org/10.1016/j.ejor.2020.02.039

[9] Spaceski, R. J. (2018). Enhancing SUC operations through integrated digital systems. Philippine Journal of Educational Management, 3(2), 87–94.

[10] Yusuf, Y., Gunasekaran, A., Musa, A., Dauda, M., El-Berishy, N., & Cang, S. (2021). A relational framework for sustainability performance measurement in supply chains. International Journal of Production Economics, 232, 107929. https://doi.org/10.1016/j.ijpe.2020.107929

[11] Zhang, J., Xie, W., & Wang, S. (2020). Improving procurement planning through data analytics and artificial intelligence. Journal of Purchasing and Supply Management, 26(3), 100624. https://doi.org/10.1016/j.pursup.2020.100624

[12] Zhukova, M., Ivanov, D., & Tsipoulanidis, A. (2022). Enhancing buyer–supplier relationships through e-procurement platforms. Supply Chain Management Review, 27(1), 15–29.

[13] Aljahdali, H. M., et al. (2020). Assessing software quality using the ISO/IEC 25010 model. Journal of Software Engineering.

[14] Chen, L., & Huang, X. (2019). Challenges in system integration and compatibility. Information Systems Research.

[15] Nielsen, J. (2018). Usability engineering.

[16] Kim, S., et al. (2021). Securing and maintaining software systems in agile environments. ACM Computing Surveys.

[17] Iqbal, H., & Babar, M. (2016). Analyzing ISO/IEC 25010 product quality requirements using fuzzy logic and Likert scale. International Journal of Advanced Computer Science and Applications.